ADDITIONAL CHARACTERIZATION OF SOIL & RISK BASED ASSESSMENT REPORT HARRY'S AUTOMOTIVE SERVICE 1606 SOUTH ORANGE AVENUE FRESNO, CALIFORNIA

Project No. 014-05051
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1.0 INTRODUCTION

The following report summarizes the results and findings for the additional characterization of soil at 1606 South Orange Avenue in Fresno, California. Krazan & Associates, Inc. (Krazan) conducted this assessment at the request of the subject site owner, Mr. Harry Moomjian. Based on the findings of the July 18, 1989 removal of two 550-gallon underground storage tanks (USTs), soil underlying the USTs was impacted from a release of gasoline petroleum hydrocarbon constituents (PHCs). Krazan conducted a preliminary subsurface site assessment at the subject site in October 1990 under the auspices of the Fresno County Environmental Health System (FCEHS). The findings of the preliminary soil assessment were summarized in Krazan's November 8, 1990 report which indicated that further assessment appeared warranted. In a June 5, 1996 letter, the FCEHS requested that Mr. Moomjian perform Risk Based Corrective Action for soil underlying the subject site. The work summarized herein was conducted in general accordance with Krazan's May 31, 2005 workplan and July 19, 2005 workplan addendum which were approved conditionally by the FCEHS in a July 26, 2005 letter. On April 1, 2005, Mr. Moomjian submitted an application for the State of California Underground Storage Tank Cleanup Fund (USTCF). The USTCF claim number is 018390. Based on data presented herein, further characterization and remediation of soil does not appear warranted.

2.0 SITE LOCATION AND DESCRIPTION

The project site address is 1606 South Orange Avenue, Fresno, California (Figure 1). The Assessor's Parcel Number is 491-090-52. The project site is located in the northeast quarter of the southwest quarter of Section 11, Township 14 South, Range 20 East on the Fresno South 7.5 Minute quadrangle, Mount Diablo Baseline and Meridian. The subject site is currently occupied by an approximately 60-foot-by-70-foot shop building and an approximately 8-foot-by-12-foot metal shed. The shop building had large roll-

up doors at the east and west ends of the building to allow for the movement of vehicles. The ground surface was paved with portland cement concrete (PCC) throughout the shop building, metal shed, and in the vicinity of the former USTs. The UST excavations were located west of the shop building and were backfilled following the 1989 tank removal activities and repaved following the 1990 assessment. Two former fuel dispensers were located within the eastern portion of the shop building. A site map including the approximate location of the former USTs and fuel dispensers are shown in Figure 2. Visual assessment of the PCC flooring of the shop building revealed the flooring appeared substantially intact with no cracks, with the exception of an occasional "hair-line" crack.

3.0 BACKGROUND

On July 18, 1989, two 550-gallon gasoline USTs were removed from the subject site by D & D Services of Clovis, California. The USTs were formerly located approximately 10 feet west of the on-site shop building. PHC odors and slight soil discoloration were noted during the removals. A soil sample was collected from a depth of eight feet below ground surface (bgs) during the removal operation from beneath each of the USTs by SSB Environmental Consultants (SSB) of Fresno, California. Chemical analysis of the soil sample collected beneath the northern UST (T-2) detected minor concentrations of total petroleum hydrocarbons as gasoline (TPH-G) and benzene, toluene, ethylbenzene, and total xylenes (BTEX). Chemical analysis of the soil sample collected beneath the southern UST (T-1) detected elevated concentrations of TPH-G and BTEX. Results of the 1989 soil sample chemical analysis are summarized on Table I.

Based on the results of the 1989 soil sample chemical analysis, the FCEHS issued a UST Unauthorized Release (leak)/Contamination Site Report on August 11, 1989. In an August 15, 1989 letter, the FCEHS requested that a preliminary site characterization be conducted. The purpose of the preliminary site characterization was to assess the vertical extent of PHCs in soil beneath each of the USTs and to examine the potential for an impact to groundwater. Krazan prepared a September 6, 1990 workplan, which was approved by the FCEHS on September 19, 1990.

Krazan conducted the preliminary site characterization field activities on October 11, 1990. Soil boring B-1 was advanced through the center of the former northern UST to approximately 30 feet. Soil samples were collected at 15, 25, and 30 feet bgs (T-2) from soil boring B-1. Soil boring B-2 was advanced through the center of the former southern UST (T-1) to approximately 55 feet bgs. Soil samples were collected at 15, 30, 45, 50, and 55 feet bgs. Based on Krazan's research prior to conducting the 1990 field activities, groundwater was inferred to be approximately 83 feet bgs.

Soil samples collected beneath the former northern UST at 15 and 25 feet bgs did not contain detectable PHC concentrations. The soil sample collected beneath the former northern UST at 30 feet bgs contained a trace concentration of xylenes. Soil samples collected beneath the southern UST at 15 and 30 feet bgs contained elevated concentrations of total volatile hydrocarbons (TVH) and BTEX. Soil samples collected beneath the southern UST at 45 and 50 feet bgs contained trace concentrations of TVH, toluene, and ethylbenzene. The soil sample collected beneath the southern UST at 55 feet bgs did not contain detectable PHC concentrations. Preliminary site characterization soil sample results are summarized on Table II.

Based on the analytical results of the soil samples collected on October 11, 1990, the FCEHS issued a letter dated January 5, 1996 requesting that Mr. Moomjian perform a Risk Based Corrective Action by:

A. *Cleanup the site*
   or
B. *Gather and present information which demonstrates that the risk posed by the gasoline and diesel constituents present in the subsurface at the subject location is insignificant.*

4.0 SUBJECT SITE SOIL PROFILE

Sediments beneath the subject site consist of silty sand and well to poorly-graded sands from ground surface to approximately 26 feet bgs and from approximately 48 to 60 feet bgs, the maximum depth explored. Fine-grained sediments consisting of silts and clayey sands were encountered from approximately 26 to 48 feet bgs. Soil boring logs from the 1990 and 2005 field activities are presented in Appendix A.

5.0 GEOLOGIC AND HYDROLOGIC SETTING

The topography of the site is relatively level. The site is located within the San Joaquin Valley, which is situated between the Sierra Nevada and Coast Ranges of California. The San Joaquin Valley comprises the southern portion of the Great Central Valley.

Unconsolidated materials found in the vicinity of the project site are generally composed of alluvial deposits of sands, silty sands, and silts with some minor clays and gravels. The source rock for this material is primarily the granitic and metamorphic rocks located in the Sierra Nevada. Sediments currently at or near the surface area believed to be of Quaternary (2 million years old or younger) alluvium derived from the nearby Sierra Nevada.

Groundwater beneath the project site exists in a single, unconfined aquifer. It is classified by U.S. Environmental Protection Agency as a sole source aquifer. As such, waters from this aquifer are highly

regulated. The aquifer's level is variable and is influenced by the withdrawal of subsurface waters for domestic and agricultural uses. According to the State of California, Department of Water Resources, (DWR) San Joaquin District map titled *Lines of Equal Elevation of Water in Wells, Unconfined Aquifer, San Joaquin Valley, Spring 2004*, the elevation of the unconfined water table beneath the subject site is approximately 200 feet above mean sea level. According to the United States Geologic Survey (USGS) 7.5 minute Fresno South, California topographic quadrangle map, the elevation of the project site is approximately 293 feet above mean sea level. Calculation using these elevations indicates that the depth to groundwater underlying the site is approximately 93 feet. According to the 2004 DWR Map and previous DWR maps, groundwater beneath the subject site generally flows in a southwest direction.

6.0 MUNICIPAL WATER WELLS

The City of Fresno Map, City of Fresno Water Well No. 22 is located approximately 1,200 feet north and upgradient of the subject site. City of Fresno Water Well No. 33 is located approximately 1,725 feet south and downgradient of the subject site. No other municipal water wells are located within one-half mile of the subject site. No other water wells within one-half mile of the subject site were identified during an August 10, 2005 drive-by survey. The approximate locations of the City of Fresno's Water Wells No. 22 and 33 are shown on Figure 1.

7.0 PURPOSE OF THE AUGUST 2005 ACTIVITIES

The purpose of the work was to assess soil underlying the location of the former southern UST so that one or more appropriate corrective actions may be identified and proposed if corrective action was deemed warranted. It was possible that additional soil borings and sample analyses could have been required to fully assess the extent of PHCs in the soil. Soil samples were collected during August 10, 2005 from three soil borings including a boring located adjacent to the 1990 soil boring B-2 which was advanced through and beneath the former location of the southern UST. Findings and soil sample analytical results associated with the 1990 investigation and the August 10, 2005 assessment were used herein to assess the level of risk posed to human health using ASTM 1739-95 guidelines.

8.0 SCOPE OF THE AUGUST 2005 ACTIVITIES

The scope of work included preparing a May 31, 2005 workplan, and July 19, 2005 workplan addendum, obtaining FCEHS drilling permits, advancing three exploratory soil borings (B-3, B-4 and B-5) to approximately 60 feet bgs, collecting and analyzing soil samples, and preparing this summary report

addressing the level of risk to human health and the potential need for corrective action. The methodology is summarized below.

The vertical and lateral delineation of the PHC-impacted soil in the vicinity of the former southern UST was conducted by advancing one boring through the center of the former southern UST excavation (B-3), and two borings up to 15 feet laterally from of the former southern UST excavation (B-4 and B-5). Boring B-4 was advanced within approximately five feet from the location of a former fuel dispenser. Soil boring locations are shown on Figure 2.

9.0 METHODOLOGY

The methods used to accomplish the purpose and scope of the August 2005 activities are listed below.

1. Before the commencement of the August 10, 2005 drilling activities, Underground Services Alert (USA) was be contacted to locate underground utilities in the public right-of-way. Before drilling, each boring location was carefully probed with a hand auger to a depth of approximately five feet bgs.

2. During the advancement of the soil borings, the soil samples were subjectively analyzed for odor and discoloration. Additionally, the soil samples were field-screened with a portable photoionization detector (PID). The PID readings were recorded on field notes and boring logs. The PID is a direct-reading real-time analyzer that can detect most of the volatile hydrocarbon constituents present in the vapor phase of petroleum-affected soils.

3. Three soil borings (B-3, B-4 and B-5) were advanced using Geoprobe® direct-push technology to approximately 60 feet bgs in the vicinity of the southern UST. No drill cuttings were generated during the fieldwork. Soil samples were collected from each of the three soil borings at 15, 30, 45, 55, and 60 feet bgs to assess soil underlying the location of the former southern UST. The samples were submitted for analysis of constituents noted below. The maximum vertical extent of PHCs was defined by two consecutive five-foot interval samples with no detectable PHC concentrations (analyzed by the California State Certified Hazardous Waste Laboratory). Soils were logged in accordance with the Unified Soil Classification System.

4. Following the collection of soil samples, the ends of the acetate sleeves were covered with Teflon® film, sealed with tight fitting plastic caps, and wrapped in Teflon® tape. A rinsate sample (R-1) was collected in a laboratory-approved 40-milliliter container. The soil and rinsate samples were properly labeled and placed in a thermal chest which contained ice to minimize the loss of volatile constituents for transportation to a State-certified analytical laboratory.

5. The soil borings were backfilled with a neat cement grout. The grout was emplaced into the boreholes with a tremie pipe in one continuous operation, from the bottom of the borehole to the ground surface. The grout was composed of a neat cement mixture containing approximately 6.5 gallons of clean water per 94-pound sack of Type I portland cement. The upper four inches of borehole were patched with PCC.

6. Equipment used for the advancing of soil borings and the sampling of soils were decontaminated (steam-cleaned, TSP, lab-grade detergents, etc.) before arriving on-site, between each boring and sampling, and before leaving the site to reduce the chances of cross-contamination.

Decontamination fluid (rinsate) was temporarily contained in a properly labeled DOT-approved steel 55-gallon drum. As noted below, soil samples collected during the August 10, 2005 fieldwork did not contain detectable PHC concentrations. Following the receipt of the analytical results, the rinsate was disposed as non-hazardous material.

7. Soil and rinsate samples were analyzed for the constituents noted below.

Constituents of Concern	Analytical Method
TPH-G	EPA Method 8015B
BTEX	EPA Method 8021B
MTBE	EPA Method 8021B

8. Field work was conducted by individuals meeting the Occupational Safety and Health Administration (OSHA) requirements for hazardous waste work including 40-hour health and safety training and medical monitoring. The work was completed under standards set forth by the industry and deemed acceptable by various regulatory agencies. Hard hats, protective eyewear and clothing, steel-toe boots, and respiratory devices were worn by Krazan's field personnel when deemed appropriate by Krazan's field personnel present.

10.0 FINDINGS OF THE AUGUST 2005 ACTIVITIES

The findings associated with the August 2005 activities are related to the soil profile, analytical results and observations of the water well drive-by survey.

10.1 Soil Profile

Sediments beneath the subject site consist of silty sand and well-to poorly-graded sands from ground surface to approximately 26 feet bgs and from approximately 48 to 60 feet bgs, the maximum depth explored. Fine-grained sediments consisting of silts and clayey sands were encountered from approximately 26 to 48 feet bgs. Soil boring logs from the 1990 and 2005 field activities are presented in Appendix A.

PID readings were zero (non-detect) for the soil samples associated with soil borings B-4 and B-5. The PID did detect trace concentrations of vapor-phase volatile constituents in soil samples B-3-15, B-3-30, and B-3-45 at 147, 67, and 101 parts per million by volume (ppmv), respectively. Soil samples B-3-55 and B-3-60 did not contain detectable concentrations of PHCs.

Following the advancement of soil boring B-3, slight PHC odors were noted emanating from the soil boring. No PHC odors were noted emanating from soil borings B-4 and B-5. No PHC odors or discoloration were noted in the soil samples collected from soil borings B-3, B-4, and B-5.

10.2 Soil Sample and Rinsate Analytical Results

As summarized on Table III, concentrations of TPH-G, BTEX, and MTBE were not detected in the August 10, 2005 soil or rinsate samples analyzed. Sample laboratory analytical reports and sample chain-of-custody are presented in Appendix B.

10.3 Drive-by Survey of Water Wells

The August 10, 2005 drive-by survey conducted to identify water wells within one-half mile of the subject site did not reveal any additional water wells other than the two municipal water wells noted above.

11.0 DISCUSSIONS OF THE 1990 AND 2005 FINDINGS

Based on the 1990 and 2005 soil sample analytical results, it appears that natural attenuation of PHCs in soil has occurred. The 1989, 1990, and 2005 soil sample analytical results are shown on generalized geologic cross section A-A' on Figure 3. The surface trace of cross section A-A' is shown on Figure 2. As shown on Figure 3, the inferred geometry of PHC-impacted soil beneath the former USTs (based solely on the worst-case scenario of the 1989 and 1990 analytical results) appears to be a relatively symmetrical ellipsoid primarily centered beneath the former location of the southern UST (T-1). The inferred geometry of the soil containing PHCs beneath the former northern UST (T-2) is also depicted on Figure 3. The extent of the PHCs in soil underlying the northern UST is also shown as an ellipsoid, albeit a significantly smaller form relative to the extent of PHCs associated with the southern UST.

Southern UST T-1

Based on the 1990 and 2005 field activities, the greatest lateral extent of PHCs directly beneath the former southern UST appears to have a diameter of approximately 15 feet at approximately 25 feet bgs. Approximately 344 cubic yards of soil appeared to have contained detectable PHCs beneath the southern UST. This equates to approximately 930,000 pounds of PHC-impacted soil beneath the southern UST. The estimated total pounds of soil were based on the assumption that the primarily sandy soils encountered have a dry density of 110 pounds per cubic foot. The average concentrations of TPH-G and benzene within specific vertical intervals of soil are noted below. The maximum vertical extent of the PHCs below the former location of the southern UST is approximately 45 feet bgs.

Average concentration of PHCs beneath the southern UST

Range in Feet bgs	Average Concentration of TPH-G (mg/kg)	Average Concentration of Benzene (mg/kg)
0 to 15	4767	43
15 to 30	445	Non-detect
30 to 45	3.3	Non-detect

Based on the 1990 soil sample analytical results, it was estimated that approximately 1738 pounds of TPH-G and 14.3 pounds of benzene were sorbed into the soil underlying the southern UST. Assuming a gallon of gasoline weighs approximately 6.15 pounds, at least 282 gallons of gasoline could have leaked into the soil as a result of the former southern UST. Based on the August 10, 2005 assessment, it appears that the PHCs underlying the southern UST did not migrate beneath the shop building located to the east of the southern UST excavation. As noted above, the soil samples collected during August 2005 did not contain detectable PHCs.

Northern UST T-2

At the time of the 1990 field activities, the greatest lateral extent of PHCs had a diameter of approximately five feet directly beneath the former northern UST at approximately nine feet bgs. Approximately 1.5 cubic yards of soil appeared to have contained detectable PHCs beneath the northern UST. This equates to approximately 8,000 pounds of PHC-impacted soil beneath the northern UST. The estimated total pounds of soil were based on the assumption that the primarily sandy soils encountered have a dry density of 100 pounds per cubic foot. The average concentrations of TPH-G and benzene within a specific vertical interval of soil are noted below.

Estimate for pounds of PHCs beneath the northern UST

Range in Feet bgs	Average Concentration of TPH-G (mg/kg)	Average Concentration of Benzene (mg/kg)
5 to 13	430	0.27

Based on the 1990 soil sample analytical results copy, it was estimated that 3.4 pounds of TPH-G and an insignificant amount of benzene were sorbed into the soil underlying the northern UST. Based on the approximate weight of gasoline, less than one gallon of gasoline could have leaked into the soil as a result of the former northern UST.

These estimates of the worst-case scenario of PHCs do not account for the mass of PHCs which may be present in vapor phase within the soil or natural attenuation that may have taken place prior to the 2005 field activities. Based on the 1990 PHC concentrations and the depth to groundwater during the August 2005 assessment (approximately 93 feet bgs), it appears that PHCs in soil beneath the former USTs did not migrate to groundwater. Based on PID readings from soil boring B-3 and the slight PHC odor noted emanating from soil boring B-3, it appears that a trace amount of PHCs in vapor phase could remain sorbed into the subsurface soils.

12.0 CONCLUSIONS AND RECOMMENDATIONS

1) The unconsolidated sediments beneath the subject site consist of silty sand and well to poorly-graded sands from ground surface to approximately 26 feet bgs and from 48 to 60 feet bgs, the maximum depth explored. Fine-grained sediments consisting of silts and clayey sands were encountered from approximately 26 to 48 feet bgs.

2) Given the July 18, 1989 UST removal activities, ongoing sources of contamination have been removed.

3) Soil borings B-1 to B-5, were advanced between October 1990 and August 2005 and it is Krazan's opinion that the subject site, in regards to the leaking USTs, has been adequately characterized.

4) No PHCs analyzed during the August 2005 activities were detected in the collected soil samples. Trace concentrations of vapor phase PHCs were detected using a PID in soil samples collected from soil boring B-3 at 15, 30, and 45 feet bgs. A slight PHC odor was noted emanating from soil boring B-3.

5) Comparing the 1990 and August 2005 activities, it appears that natural attenuation over 15 years has decreased the concentrations of PHCs in soil to non-detectable concentrations.

6) Based on the 1989 and 1990 soil sample analytical results, approximately 8,000 pounds of soil containing PHCs had been present beneath the former northern UST. Approximately 3.4 pounds of TPH-G and less than one gallon of gasoline leaked into the subsurface as a result of the former northern UST.

7) Based on the 1989 and 1990 soil sample analytical results, 930,000 pounds of soil containing PHCs had been present beneath the former southern UST. Approximately 1,738 pounds of TPH-G containing PHCs and 14.3 pounds of benzene comprising up to 282 gallons of gasoline leaked into the subsurface as a result of the former southern UST. PHC-impacted soil did not migrate beneath the shop building located to the east of the former southern UST excavation.

8) City of Fresno Water Wells No. 22 and 33 are located within one-half mile of the subject site. The depth to groundwater beneath the subject has declined from approximately 83 feet bgs in 1990 to approximately 93 feet bgs in 2005. Based on the 1990 and 2005 soil sample analytical results and the subject site's proximity to Water Wells No. 22 and 33, it is Krazan's opinion that any remaining constituents in soil would not impact water supply wells, drinking water aquifers, surface water, or any other sensitive receptors.

9) Given the foregoing, it does not appear warranted to remediate the residual PHCs using routine techniques including soil excavation and off-site disposal or soil vapor extraction. Excavation of soil below a depth of 20 feet is not feasible. The permitting installation, operation and removal of a SVE system would likely cost approximately $75,000 to $155,000. The limited amount of PHCs present and the apparent natural attenuation that has occurred does not justify the effort and expense. The worst-case scenario of using the 1990 soil sample analytical data was used to conduct a screening risk assessment.

13.0 SCREENING RISK ASSESSMENT

The objectives of the exposure "risk" assessment are to: 1) identify the human receptor populations, 2) define reasonable and site-specific maximum exposure scenarios representing conservative "worst-case" exposures, 3) identify and characterize the potential exposure pathways, and 4) estimate constituents of concern (COC) concentrations (constituents related to gasoline) at the exposure points.

Risk assessment calculations were conducted in compliance with ASTM Standard E1739-95, *Standard Guidelines for Risk-Based Corrective Action (RBCA) Applied at Petroleum Release Sites* and are consistent with US EPA risk and exposure assessment practices. The RBCA process is implemented in a tiered approach in which different tiers employ increasingly more site-specific data and often result in less-conservative exposure scenarios.

A Tier II analysis for the subject site was conducted. The analysis was restricted to assessing the risk associated with soil underlying the location of the southern UST (T-1) because the extent of the impacted soil underlying the northern UST was limited and the mass of PHCs essentially insignificant. The software package "Tier II RBCA Toolkit," including the RBCA Spreadsheet System and Modeling Guidelines, Version 1.0, produced by GSI of Houston, Texas, was used to determine potential risks at the site. This package employs the calculations/parameters given in ASTM E 1739-95 allowing for site specific data on concentrations and constituents by source media and data regarding exposure and environmental factors.

13.1 Proposed Site Use

The proposed site use will continue to be a non-residential commercial operation.

13.2 Data Evaluation

Analytical results for soil samples collected during the 1989, 1990, and August 2005 soil assessments were used to predict the model input COC concentrations in soil and groundwater. The procedures used to estimate a concentration followed the equations presented in ASTM E1739-95, as implemented by the GSI computer program. Example input and output data from this program are presented in Appendix C.

For soil analytical data, various statistical procedures were handled by the GSI computer program. Representative COC concentrations (carbon range fractions) were determined from soil analytical data obtained during the various site assessment activities. This risk assessment process considers nondetected results by using half of the detection limit as a proxy concentration for nondetected concentrations. Values used in the GSI program assumed that the representative concentrations extended from depths of eight feet to 45 feet bgs and represent the arithmetic mean of these soil analytical data and also represent a reasonable maximum exposure (RME) concentration that has been used to predict COC concentrations in

vapor emissions above impacted soil. The data used in the GSI program are presented in Tables I, II and III. Representative fraction average concentrations are presented on page 13 in Appendix C and are listed below.

Constituents of Concern	Soil Source Zone (T-1) mg/kg
Benzene	14
Toluene	43
Ethylbenzene	59
Xylenes (mixed isomers)	450
TPH-Aromatic C5-C7	1700

13.2.1 Exposure Scenarios

The exposure scenarios are intended to represent a RME (ASTM, 1995) or a conservative "worst-case" exposure, particularly when considering the use of 1989 and 1990 soil sample data which has been shown to have experienced some natural attenuation. Default and site-specific parameters, including averaging time of COC, body weight, exposure frequencies, and inhalation rates, are presented on Input Parameter Summary Table on page 31 in Appendix C.

13.2.2 Human Receptor Populations

A human receptor population is a person or set of people who can be exposed to COC at the site at a specific exposure point. The human populations that can be potentially exposed to COC at the site are the commercial workers.

13.2.3 Pathways of Human Exposure

Pathways of exposure describe the transport medium by which human populations can be exposed and the route of entry into the body. Soil, groundwater, and air may serve as transport media for COC, to which human receptors may be exposed. COC concentrations were detected within soil beneath limited portions of the site. The potential exposure pathways are as follows: 1) dermal contact/absorption and ingestion of soil, 2) dermal contact/absorption and ingestion of groundwater, 3) inhalation of vapors emitted from soil in indoor air, and 4) inhalation of vapors emitted from soil in outdoor air.

Worksheets in Appendix C summarize the potential exposure pathways for each exposure scenario considered. The exposure pathway considered for the exposure scenario is the emission of COC from soil as vapor, and the migration of these vapors upward through the unsaturated soil (vadose zone) to the ground surface, potentially causing human receptor exposure to COC vapor in ambient (outdoor) air and during occupation (indoor air) of the commercial structures. Pertinent factors for the SRA are listed below.

1. Potential Exposure Pathways: Affected soils volatilization to ambient outdoor air in a non-residential setting.

   Affected soils – volatilization to enclosed space in a non-residential setting.

   COC Vertical Distribution:Extends approximately eight to 45 feet below ground surface.

2. One COC is a carcinogen (benzene), so there is carcinogenic risk.

3. COC Inhalation Reference Concentrations (RFC) are listed on page 10 in Appendix C.

4. COC fraction-specific Reference Doses (RfD) are listed on page 10 in Appendix C.

The rationale for limiting the exposure assessment to soil volatilization to indoor air and outdoor air are presented below.

Dermal Contact/Absorption and Ingestion of Soil

Soil containing COC will primarily underlie portland cement (PCC) concrete pavement at a minimum depth of approximately eight feet bgs. Based on the foregoing, dermal contact/absorption and ingestion of soil do not appear to pose a potential exposure pathway at the subject site.

Dermal Contact/Absorption and Ingestion of Groundwater

COCs are not present in underlying groundwater. Potable water is supplied to the site from a monitored municipal source. Based on the foregoing, dermal contact/absorption and ingestion of groundwater do not appear to pose a potential exposure pathway at the subject site. In addition, a potential groundwater exposure pathway for off-site receptors does not appear to be present.

Inhalation of COC Vapors Emitted from Soil: Indoor Air - Commercial Scenario

Based on the findings of the cumulative soil and groundwater assessments, there is evidence that soil has been impacted by COC concentrations at the site. The future use of the subject site will continue to be in a non-residential capacity. Although it is unlikely that an actual threat to human health exists as a result of residual COCs in soil, the pathway associated with soil volatilization to indoor air (commercial scenario) appears to be complete. Therefore, the potential indoor air exposure pathway for inhalation of COC-containing vapor from soil appears applicable to this exposure assessment and was analyzed by the ASTM Tier II process.

Inhalation of COC Vapors Emitted from Soil: Outdoor Air - Commercial Scenario

Because the COC is present beneath PCC and primarily below a depth of eight feet bgs, it is unlikely that COC vapors would occur in discernible concentrations in outdoor air. Although it is unlikely that an actual threat to human health exists as a result of residual COCs in soil, the pathway associated with soil volatilization to outdoor air (commercial scenario) appears to be complete. Therefore, the potential outdoor air exposure pathway for inhalation of COC containing vapor from soil appears applicable to this exposure assessment and was analyzed by the ASTM Tier II process.

13.2.4 Estimate of Exposure Concentrations

To characterize exposure to COC in ambient air via inhalation, ambient air concentrations of COC are estimated in the breathing zone (outdoor and indoor air for the commercial scenario). Ambient air concentrations are estimated using a three step process:

1. Estimate the COC vapor concentrations emitted from soil.
2. Estimate the COC vapor flux through the vadose zone to ground surface.
3. Estimate the breathing zone COC concentration using the vapor flux estimate.

The methods and equations used to derive these values are described in ASTM, 1995. Worksheets in Appendix C (primarily on page 7) list the variable values for the equations used.

13.2.5 Exposure Pathway Model

Exposure assessments commonly use fate and transport models to estimate exposure concentrations. Figure 4 - Screening Risk Assessment Conceptual Model, illustrates the conceptual model of the exposure pathway for the exposure scenarios considered. Derivation of the exposure concentration of COC in ambient air at the endpoint of the exposure pathways consists of a sequence of analytical equations published by ASTM, 1995. The modeled concentration, representing a RME continuous exposure-point concentration in ambient air, is used to predict incremental carcinogenic risks to potential receptors (child and adult) using exposure intake equations and standard default values developed by the U.S. EPA (ASTM, 1995).

The model very conservatively assumes that: 1) there is a continuous and nondiminishing source of COC in soil, 2) the transport of COC vapor is upward, 3) the diffusion along a concentration gradient determines its flux, and 4) biodegradation, chemical oxidation, hydrolysis, or other processes to reduce vapor concentration do not occur in the subsurface.

13.2.6 Modifications of Default Parameters

Site-specific air parameters are listed on page 7 within Appendix C. The GSI's default parameter for "foundation crack fraction" is 0.01, or one percent. In accordance with Krazan's principal engineer and registered civil and geotechnical engineer, a foundation crack factor of one percent is very conservative. Recent observations of the building foundation (floor) revealed no obvious significant cracks or breaks. Krazan chose to use a value of 0.005, or one-half of one percent (0.50 square feet of open crack per 100 square feet of PCC) as a foundation crack factor in calculations related to assessing the indoor air pathway. Given that there is no evidence that the PHCs directly underlie the building foundation, this value appears appropriate.

14.0 TOXICITY ASSESSMENT

14.1 Carcinogens

Carcinogenicity is defined in terms of a probability. The probability identifies the likelihood of a tumorigenic response in an individual exposed to a given dose of carcinogen over a lifetime. The probability is determined by multiplying the daily dose factor by the slope factor. The slope factor is a regulatory-derived value that can be described as a relative measure of carcinogenic potency for the exposure pathway (e.g., oral or inhalation).

The daily dose factor is specific to an exposure pathway and consists of an algebraic expression of exposure factors that estimates daily human intake of a chemical at the exposure pathway endpoint. For this exposure assessment, the daily dose factor used is the inhalation potential dose factor (IPDF) (U.S. EPA, 1989) for the air pathway. The carcinogen evaluated for this SRA is listed below:

- Benzene

14.2 Non-Carcinogens

The non-carcinogens evaluated for this SRA and the following carbon fraction ranges are listed below:

- Aromatic TPH C5-C7 (TPH-G)
- Ethylbenzene
- Total xylenes
- Toluene

15.0 EXPOSURE ANALYSIS

ASTM (1995) generally recommends the use of default exposure factors as first approximations to estimate a reasonable maximum exposure to a chemical. The exposure factors used in the IPDF were selected from default values published by the U.S. EPA (1989, 1991, and 1992) and the American Industrial Health Council (1994), and are listed on Input Parameter Summary Table on page 13 in Appendix C. The exposure factors used reflect commercial land-use settings. Worksheets in Appendix C list the IPDF equation and the values for the exposure scenarios.

The ASTM Tier II approach uses various physical, chemical, and health exposure input parameters with which risk characterization is calculated. In the absence of direct, site-specific measurements, default values may be selected for some parameters. A summary of input parameters used during the subject exposure assessment are presented on worksheets in Appendix C. The default parameters for molecular weight, solubility, vapor pressure, and Henry's Law Constant from GSI's version 1.0 of the Tier II RBCA Toolkit were used.

16.0 RISK CHARACTERIZATION

According to Section X1.7.11 ASTM, 1995, "in summary, US. Federal and state regulatory agencies have adopted a one-in-one-million cancer risk (Target Risk) as being of negligible concern in situations where large populations (for example, 200 million people) are involuntarily exposed to suspect carcinogens (for example, food additives). When smaller populations are exposed (for example, in occupational settings), theoretical cancer risks of up to 10^{-4} (1 in 10,000) have been considered acceptable." A target risk of 10^{-6} (1 in 100,000,000) was used as the acceptable cancer risk for individuals for this SRA.

This theoretical cancer risk has been used by Krazan on similar projects and has been considered acceptable by regulatory agencies.

16.1 Results of Subject Exposure Assessment

The RBCA assessment was calculated and the results are summarized on page 1, the "Tier II Baseline Risk Summary Table" included in Appendix C. For purposes of this assessment, an individual carcinogenic risk of 1.0×10^{-6} and hazard and quotient index (for non-carcinogenic compounds) of 1.0 were used. In general, the groundwater exposure pathway was not found to be complete and the soil

exposure pathway was not found to be complete (assuming contact with soil at a minimum depth of eight feet bgs will not occur). A summary of the SRA results is shown on Table IV.

As noted in Table IV, the baseline carcinogenic risks and baseline toxic effects for outdoor air are below their respective risk limits assuming a commercial scenario. The carcinogenic risks related to indoor air are slightly exceeded for the individual COC carcinogenic risk and the effects are discernibly exceeded for the hazard quotient and index. However, given that the SRA was prepared using "worst-case" scenario incorporating data that suggests the PHCs detected in 1989 and 1990 have experienced some attenuation, it would appear that the calculated risk levels for indoor air may be overly conservative.

17.0 SOURCES OF UNCERTAINTY

The following four broad areas are noted where uncertainties may be found in the exposure assessment process:

- Generation of chemical-specific human risk values by Federal agencies through animal tests and/or epidemiological studies.
- Collection of site-specific data, specifically, lack of soil vapor concentration measurement.
- Merging chemical-specific risk estimates with site-specific data.
- Conservative over-predictive modeling assumptions (e.g., assuming a continuous and non-diminishing source), including default parameters used to calculate cumulative cancer risk related to COC vapor emanating from soil and groundwater.

For each area, a number of factors may increase or decrease the confidence in the accuracy of the exposure assessment. These factors, as they may apply to this exposure assessment, are as follows.

17.1 Animal Tests and/or Epidemiological Studies

Choice of species, strain, age, and sex of animals:

- The number of animals or persons in the study.
- Similarity in the routes of exposure between tested species and route of interest in humans.
- Purity of test compound.
- Decay of test compound and vehicle contribution.
- Selection of dose levels and use of control groups.
- Distribution of animals among doses.

- Similarity between test animals and humans in metabolism and pharmacokinetics.
- Statistical noise; statistical methods used to analyze data.
- Proper histopathological examination of animals.
- Proper animal husbandry and dietary considerations.
- Experimental surroundings.
- Consideration of concurrent exposures in epidemiological studies.
- Exposure measurements concurrent to the period being evaluated in epidemiological studies.
- Selection of proper endpoint in animal or epidemiological studies.
- Synergism/antagonism.
- Animal-to-human extrapolism: high dose to low dose, choice of dose/response model, confidence intervals.
- Use of most sensitive, inbred animals versus average, heterogeneous animals.

17.2 Collection of Site Data

Rationale for sample locations:

- Sample collection methods and QA/QC procedures.
- Analytical methods, detection limits, and QA/QC procedures.
- Accurate characterization of area geology and hydrogeology.
- Representativeness and completeness of data.
- Adequacy of data to describe site conditions.
- Characterization of exposed or potentially exposed populations.
-

17.3 Development of Exposure Assessment

Errors associated with numerical approximation methods:

- Laboratory analyses errors.
- Estimations of receptor population characterizations.
- Interpretation of laboratory data.

17.4 Strengths

It is assumed by Krazan that previous investigations were conducted using currently accepted standards of the industry and those of appropriate regulatory agencies. The techniques used in preparing this exposure assessment are based upon ASTM and U.S. EPA guidance, the current understanding of mechanisms of human exposure, and the toxicological properties of the chemicals identified through site sampling activities. Additionally, conservative assumptions regarding the toxicity of the indicator chemicals and exposure (i.e., a continuous, non-diminishing source) have also been used for all calculations. Therefore, any uncertainties in this area will tend to err, if at all, on the conservative side.

18.0 CONCLUSIONS

Conclusions based on the additional site assessment and SRA are summarized below:

1. The anticipated future site use will be for commercial occupation and, considering the quantitative exposure assessment herein, it appears that the risk to human health posed by the COC in soil is acceptable. In general, the groundwater exposure pathway was not found to be complete. The soil exposure pathway was not found to be complete (assuming contact with soil at a minimum depth of eight feet bgs will not occur). The carcinogenic risks and hazard quotient and hazard index associated with the noncarcinogen baseline toxic effects for outdoor air exposure pathways were less than the applicable limits. The carcinogenic risks for indoor air are slightly exceeded and the hazard quotient and hazard index associated with the noncarcinogen baseline toxic effects for indoor air exceeded the applicable limits.

2. The cumulative findings presented herein indicate a relatively limited extent of contaminated soil in a stable condition underlie relatively limited portions of the site. The brief discussion of remedial alternatives demonstrates that active remediation would likely be a very expensive and lengthy process that may not be justified given the current PHC concentrations and non-residential use of the property. Available evidence suggests natural attenuation is occurring. Therefore, on behalf of Harry's Automotive Service, Krazan respectfully requests that the FCEHS issue a written statement that no further action is warranted at the subject site.

19.0 LIMITATIONS

The findings of this report were based upon the results of our field and laboratory investigations, along with the interpretation of subsurface conditions associated with our soil boring. Therefore, the data are accurate only to the degree implied by review of the data obtained and by professional interpretation.

The exploratory soil borings were located in the field by review of available maps, site conditions and by tape measurement from existing landmarks. Therefore, the location of the soil borings should be considered accurate only to the degree implied by the methods used to locate them.

Chemical testing was done by laboratories certified by the State of California Department of Health Services. The results of the chemical testing are accurate only to the degree of care of ensuring the testing accuracy and the representative nature of the soil samples obtained.

The findings presented herewith are based on professional interpretation using state of the art methods and equipment and a degree of conservatism deemed proper as of this report date. It is not warranted that such data cannot be superseded by future geotechnical, environmental, or technical developments.

20.0 CLOSING

If you have any questions or if we may be of further assistance, please do not hesitate to contact our office at (559) 348-2200.

Respectfully submitted,
KRAZAN & ASSOCIATES, INC.

Mark D. Edwards
Professional Geologist No. 7714

Arthur H. Morrill
Professional Geologist No. 5383

MDE/AHM/nr

1c: Mr. Harry Moomjian
1c: Mr. Jim Armstrong, FCHES
1c: Mr. John Noonan, RWQCB

TABLE I
Soil Sample Analytical Results
UST Removal Sampling
Harry's Automotive Service
1606 South Orange Avenue
Fresno, California
SSB Environmental Consultants
July 18, 1989 Sampling
(Concentrations in milligrams per kilogram (mg/kg))

Sample Location	B	T	E	X	TPH-G
T-1*	130	340	490	3700	13,000
T-2*	0.27	1.2	1.6	11	430

UST = Underground storage tank.
BTEX = Benzene, toluene, ethylbenzene, and total xylenes.
TPH-G = Total petroleum hydrocarbons as gasoline.
* = Sample collected at approximately three feet beneath the bottom of the UST.

TABLE II
Soil Sample Analytical Results
Preliminary Site Characterization
Harry's Automotive Service
1606 South Orange Avenue
Fresno, California
Krazan & Associates, Inc.
October 11, 1990 Sampling
(Concentrations in milligrams per kilogram (mg/kg))

Sample I.D.	B	T	E	X	TVH
T- 2					
B-1 @ 15 ft.	ND	ND	ND	ND	ND
B-1 @ 25 ft.	ND	ND	ND	ND	ND
B-1 @ 30 ft.	ND	ND	ND	0.11	ND
T-1					
B-2 @ 15 ft.	0.30	32	29	210	1300
B-2 @ 30 ft.	ND	15	16	110	890
B-2 @ 45 ft.	ND	ND	ND	0.03	ND
B-2 @ 50 ft.	ND	ND	0.02	0.39	10
B-2 @ 55 ft.	ND	ND	ND	ND	ND

BTEX = Benzene, toluene, ethylbenzene, and total xylenes by EPA Method 8020.
TVH = Total volatile hydrocarbons by EPA Method 8015M.
ND = Not detected at or above the laboratory reporting limit.

TABLE III
Soil and Rinsate Sample Analytical Results
Additional Soil Assessment
Harry's Automotive Service
1606 South Orange Avenue
Fresno, California
Krazan & Associates, Inc.
August 10, 2005 Sampling
(Concentrations expressed in milligrams per kilogram [mg/kg], unless otherwise noted)

Sample No.	Sample Depth (ft. bgs)	TPH-G	B	T	E	X	MTBE
B-3-15	15	ND	ND	ND	ND	ND	ND
B-3-30	30	ND	ND	ND	ND	ND	ND
B-3-45	45	ND	ND	ND	ND	ND	ND
B-3-55	55	ND	ND	ND	ND	ND	ND
B-3-60	60	ND	ND	ND	ND	ND	ND
B-4-15	15	ND	ND	ND	ND	ND	ND
B-4-30	30	ND	ND	ND	ND	ND	ND
B-4-45	45	ND	ND	ND	ND	ND	ND
B-4-55	55	ND	ND	ND	ND	ND	ND
B-4-60	60	ND	ND	ND	ND	ND	ND
B-5-15	15	ND	ND	ND	ND	ND	ND
B-5-30	30	ND	ND	ND	ND	ND	ND
B-5-45	45	ND	ND	ND	ND	ND	ND
B-5-55	55	ND	ND	ND	ND	ND	ND
B-5-60	60	ND	ND	ND	ND	ND	ND
R-1	N/A	ND	ND	ND	ND	ND	ND

Ft.bgs = feet below ground surface
TPH-G = Total petroleum hydrocarbons as gasoline by EPA Method 8015B.
BTEX = Benzene, toluene, ethylbenzene, and total xylenes by EPA Method 8021B.
MTBE = Methyl tertiary butyl ether by EPA Method 8021B.
NA = Not applicable.
ND = Not detected at or above laboratory reporting limit.
R-1 = Rinsate sample expressed in micrograms per liter.

TABLE IV
Summary of SRA Results
Harry's Automotive Service
Fresno, California

	Individual Cancer Risk	Cumulative Cancer Risk	Hazard Quotient	Hazard Index
Outdoor Air Pathway	$1.3x10^{-7}$	$1.3x10^{-7}$	$47.4x10^{-1}$	$7.5x10^{-1}$
Indoor Air Pathway	$8.8x10^{-5}$	$8.8x10^{-5}$	$5.1x10^{2}$	$5.1x10^{2}$
Target Risks	$1.0x10^{-6}$	$1.0x10^{-5}$	1.0	1.0

Individual Cancer Risk = Risk associated with the maximum value of an individual carcinogen.
Cumulative Cancer Risk = Risk associated with the cumulative value of combined carcinogens.
Hazard Quotient = Hazard value associated with the maximum of an individual non-carcinogenic compounds.
Hazard Index = Hazard value associated with the cumulative amount of combined non-carcinogenic compounds.

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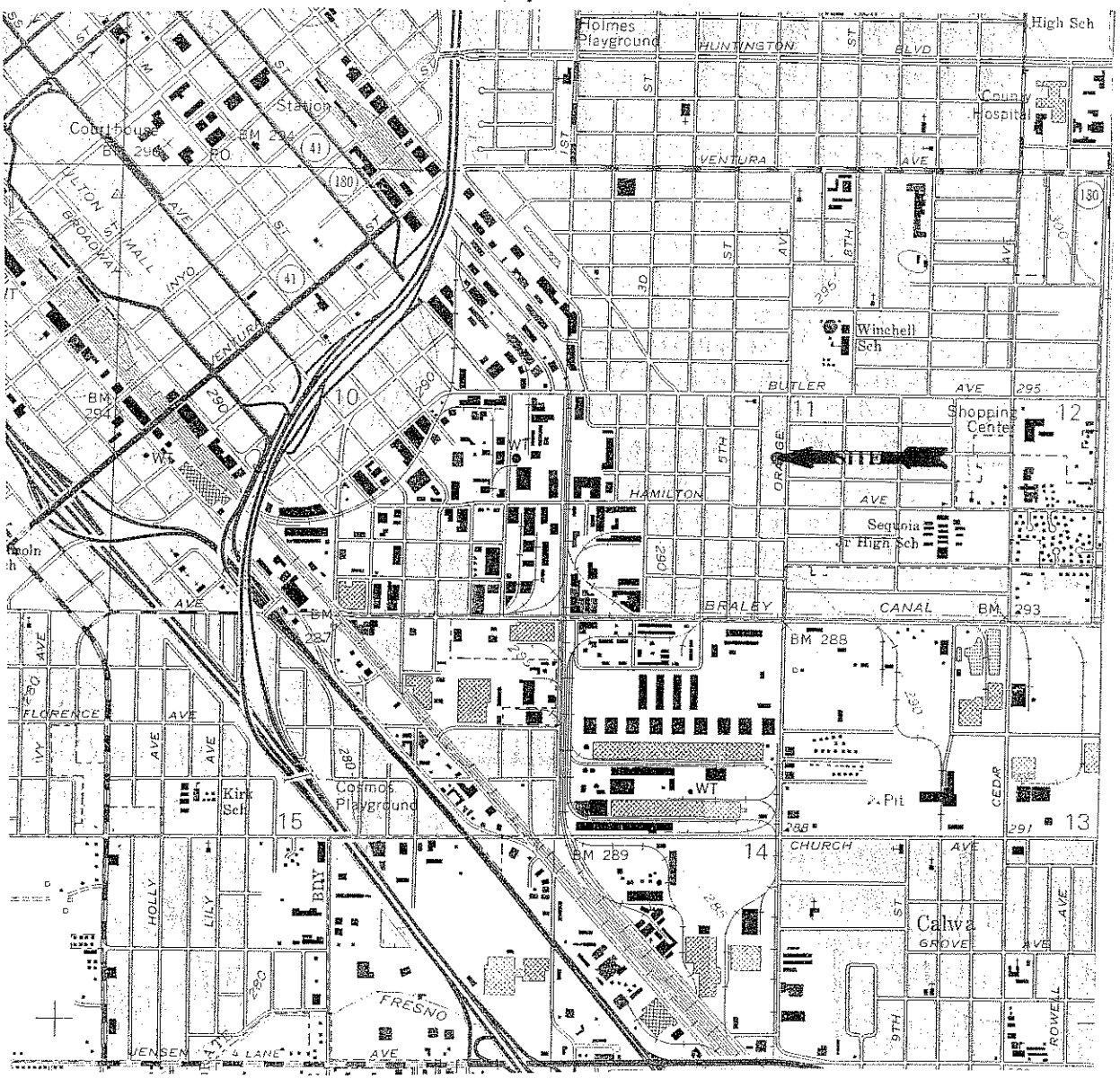


MAP SOURCE:
7.5 MINUTE SERIES
U.S.G.S. TOPOGRAPHIC MAP
FRESNO SOUTH, CA
DATED 1963
PHOTOREVISED 1981

NORTH

0' 2000' 4000'

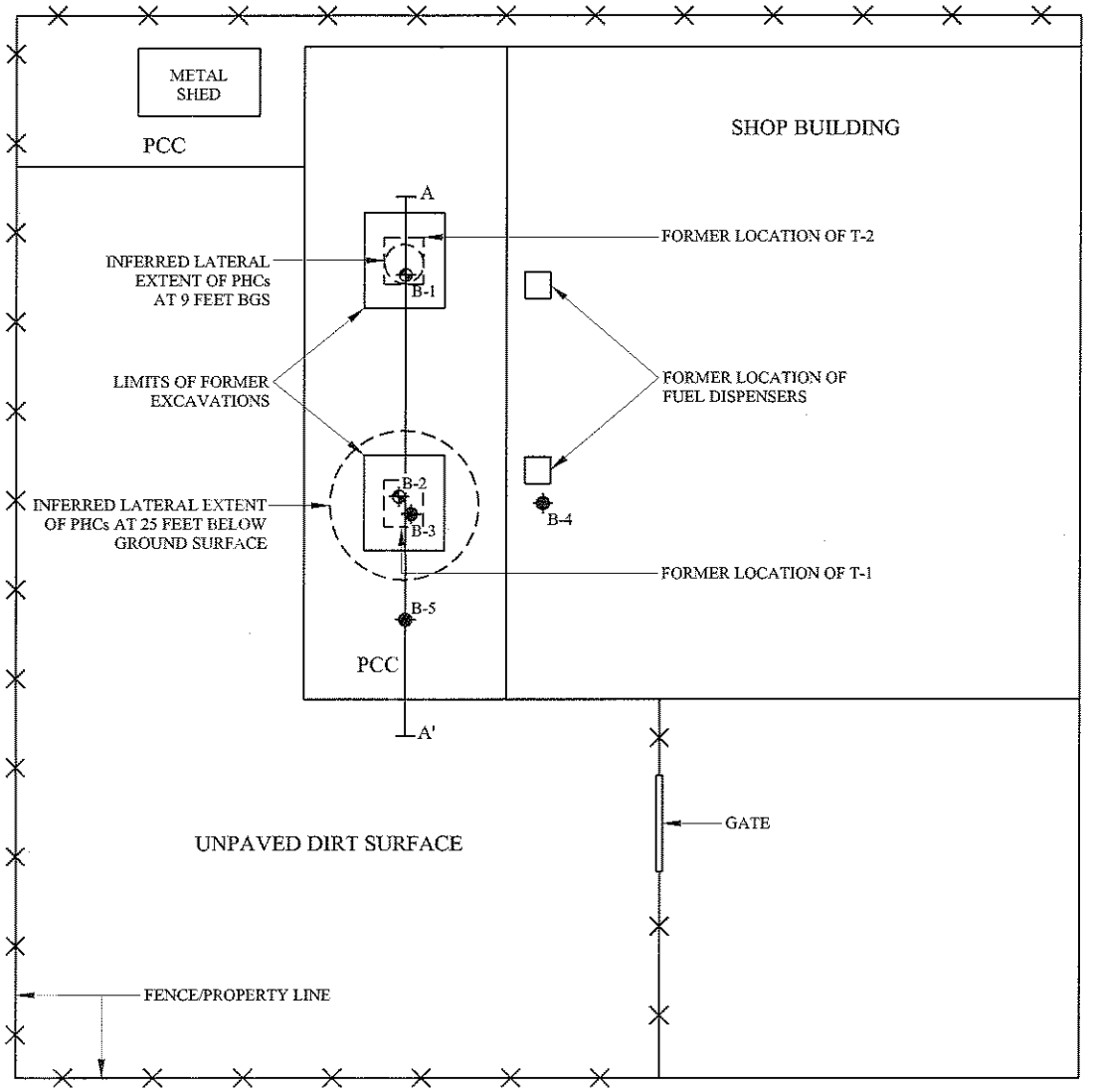
SCALE IN FEET (±)
*ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE

VICINITY MAP

HARRY'S AUTOMOTIVE SERVICE
1606 SOUTH ORANGE AVENUE
FRESNO, CALIFORNIA

Scale:	Date:
AS SHOWN	5/05
Drawn by:	Approved by:
A. L. F.	M. D. E.
Project No.	Figure No.
014-05051	1

Krazan
SITE DEVELOPMENT ENGINEERS
Offices Serving the Western United States



EXPLANATION

PHCs PETROLEUM HYDROCARBON CONSTITUENTS

PCC PORTLAND CEMENT CONCRETE

B-1 APPROXIMATE LOCATION OF KRAZAN'S 1990 SOIL BORING

B-3 APPROXIMATE LOCATION OF KRAZAN'S 2005 SOIL BORING

NORTH

0' 20' 40'

SCALE IN FEET (±)

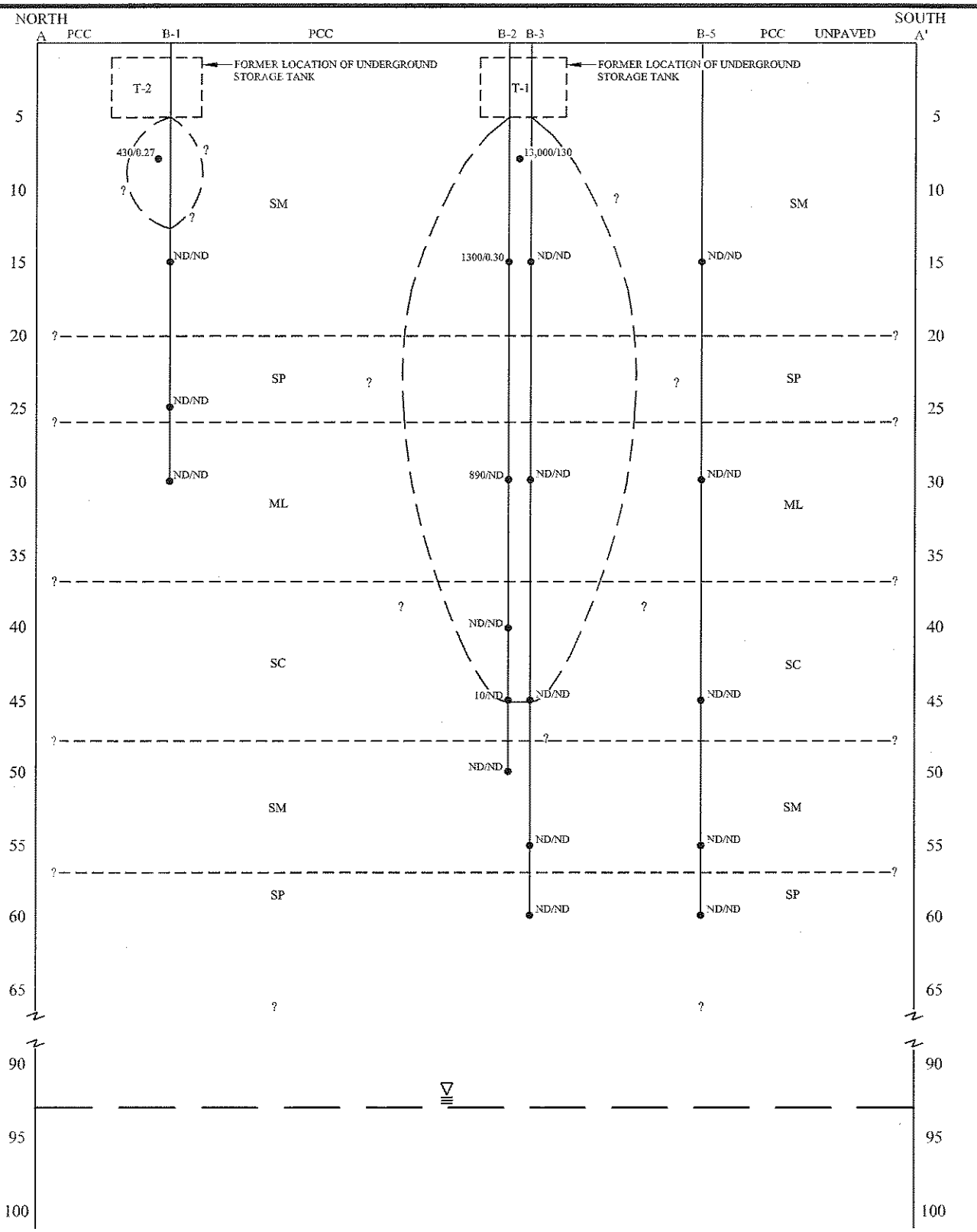
*ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE

SOIL BORING LOCATIONS MAP WITH TRACE OF GENERALIZED GEOLOGIC CROSS SECTION A-A' AND INFERRED EXTENT OF PETROLEUM HYDROCARBONS

HARRY'S AUTOMOTIVE SERVICE
1606 SOUTH ORANGE AVENUE
FRESNO, CALIFORNIA

Scale:	Date:
AS SHOWN	12/05
Drawn by:	Approved by:
S. A.	M. D. E.
Project No.	Figure No.
014-05051	2

Krazan
SITE DEVELOPMENT ENGINEERS
Offices Serving the Western United States



EXPLANATION

- INFERRED EXTENT OF PETROLEUM HYDROCARBON CONSTITUENTS
- INFERRED CONTACT BETWEEN GEOLOGICAL UNITS
- 13,000/130 SOIL SAMPLES WITH CONCENTRATIONS OF TOTAL PETROLEUM HYDROCARBONS AS GASOLINE/BENZENE IN MILLIGRAMS PER KILOGRAM
- B-1 APPROXIMATE LOCATION AND TRACE OF SOIL BORING
  B-1 AND B-2 KRAZAN 1990
  B-3 AND B-5 KRAZAN 2005

PCC PORTLAND CEMENT CONCRETE
SM SILTY SAND
SP SAND
ML SILT
SC CLAYEY SAND
ESTIMATED DEPTH TO GROUNDWATER

0' 10' 20'
SCALE IN FEET (±)
*ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE

GEOLOGICAL CROSS SECTION OF A-A' AND INFERRED EXTENT OF PETROLEUM HYDROCARBONS

HARRY'S AUTOMOTIVE SERVICE
1606 SOUTH ORANGE AVENUE
FRESNO, CALIFORNIA

Scale:	Date:
AS SHOWN	12/05
Drawn by:	Approved by:
S. A.	M. D. E.
Project No.	Figure No.
014-05051	3

Krazan
SITE DEVELOPMENT ENGINEERS
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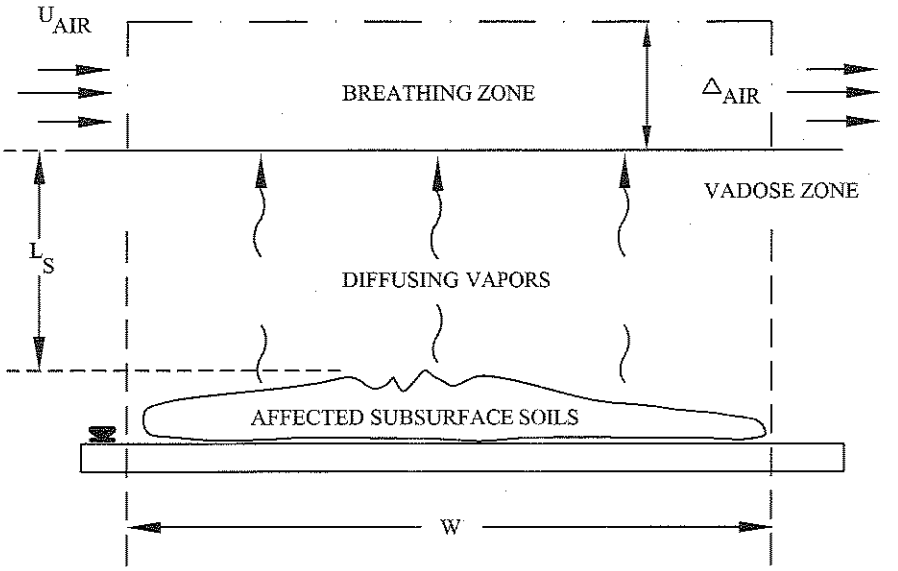
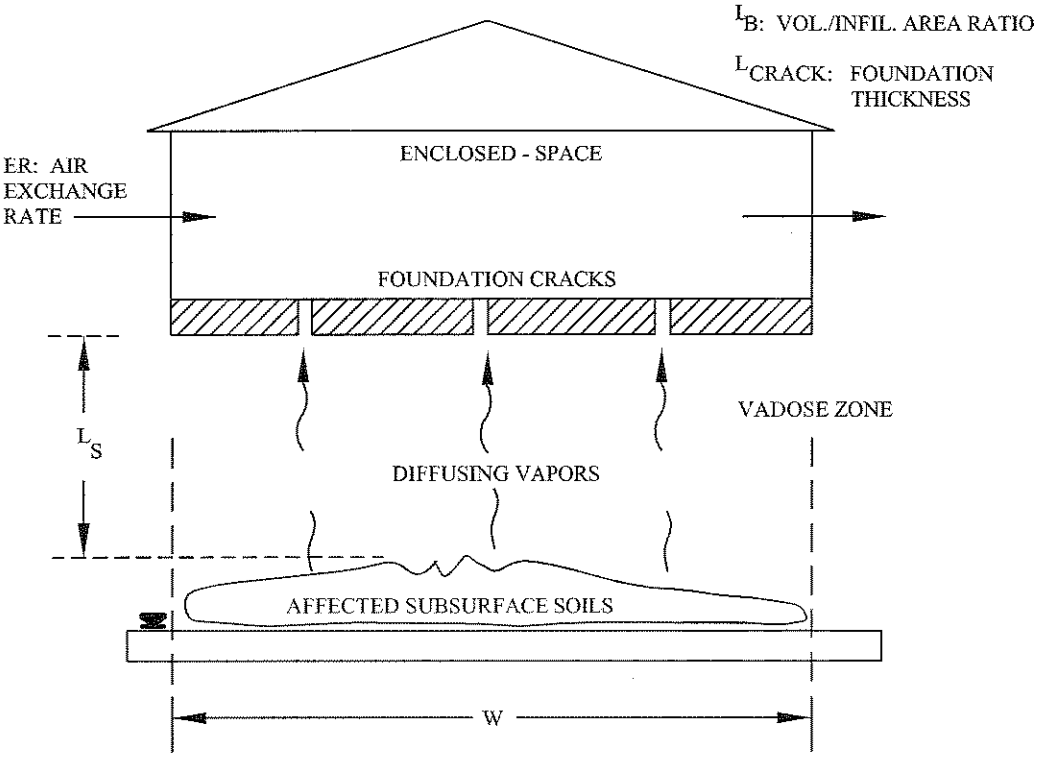


SUBSURFACE SOIL VOLATILIZATION



SUBSURFACE SOIL TO ENCLOSED SPACE VOLATILIZATION

SCREENING RISK ASSESSMENT CONCEPTUAL MODEL

SCREENING RISK ASSESSMENT CONCEPTUAL MODEL	Scale: NTS	Date: 12/05
	Drawn by: S. A.	Approved by: A. H. M.
HARRY'S AUTOMOTIVE SERVICE 1606 SOUTH ORANGE AVENUE FRESNO, CALIFORNIA	Project No. 014-05051	Figure No. 4

Krazan
SITE DEVELOPMENT ENGINEERS
Offices Serving the Western United States

Project: Harry's Automotive Service
1606 South Orange Avenue, Fresno, California

Boring No. 1
Project No. E90-166

DATE DRILLED: 10-11-90 TYPE OF BORING: 4 1/4" I.D. Hollow Stem Auger

HOLE ELEV: _____ GROUNDWATER LEVEL: _____ LOGGED BY: RH

Depth (Ft)	Odor	PID Reading	Undistrubed Sample	Graphic Log	Soil Classification	SOIL DESCRIPTION
5	NO	0	XX		(fill)	Fine gravel, fine to medium SAND (SW), medium brown, moist, drills easy.
					SW	Slight odor from cuttings at approximately 8 feet.
10	NO	0	XX		ML	Fine to medium SAND (ML), light brown, slightly moist, drill easy, partially cemented.
15	NO	0	XX		SW	Fine to medium SAND (SW), light brown, moist, drills easy, subangular to angular, predominatley quartz.
20	NO	0	XX			Fine to coarse SAND with fine gravel, partly cemented, below 18 feet.
25	NO	0	XX			Fine to medium SAND, no cementation below 24 feet.

*R = Refusal, greater than 100 blows/foot

KRAZAN & ASSOCIATES, INC.

Project: Harry's Automotive Service
1606 South Orange Avenue, Fresno, California

Boring No. 1
Project No. E90-166

DATE DRILLED: 10-11-90 TYPE OF BORING: 4 1/4" I.D. Hollow Stem Auger

HOLE ELEV: _____ GROUNDWATER LEVEL: _____ LOGGED BY: RH

Depth (Ft)	Odor	PID Reading	Undisturbed Sample	Graphic Log	Soil Classification	SOIL DESCRIPTION
30	NO	0	XX		SW	
						BOTTOM OF BORING
35						
40						
45						
50						

*R = Refusal, greater than 100 blows/foot

KRAZAN & ASSOCIATES, INC.

Project: Harry's Automotive Service
1606 South Orange Avenue, Fresno, California

Boring No. 2
Project No. E90-166

DATE DRILLED: 10-11-90 TYPE OF BORING: 4 1/4" I.D. Hollow Stem Auger

HOLE ELEV: _____ GROUNDWATER LEVEL: _____ LOGGED BY: RH

Depth (Ft)	Odor	PID Reading	Undisturbed Sample	Graphic Log	Soil Classification	SOIL DESCRIPTION
5	SLT	4	XX		(fill)	Fine gravel, fine to medium SAND (SW), medium brown, moist, drills easy.
					SW	Slight odor from cuttings at approximately 8 feet.
10	STR	300	XX		ML	Fine to medium SAND (ML), light brown, slightly moist, drill easy, partially cemented.
15	STR	300	XX		SW	Fine to medium SAND (SW), light brown, moist, drills easy, subangular to angular, predominatley quartz.
20	STR	300	XX			Fine to coarse SAND with fine gravel, partly cemented, below 18 feet.
25	STR	300	XX			Fine to medium SAND, no cementation below 24 feet.

*R = Refusal, greater than 100 blows/foot

KRAZAN & ASSOCIATES, INC.

Project: Harry's Automotive Service
1606 South Orange Avenue, Fresno, California

Boring No. 2
Project No. E90-166

DATE DRILLED: 10-11-90 TYPE OF BORING: 4 1/4" I.D. Hollow Stem Auger

HOLE ELEV: _____ GROUNDWATER LEVEL: _____ LOGGED BY: RH

Depth (Ft)	Odor	PID Reading	Undisturbed Sample	Graphic Log	Soil Classification	SOIL DESCRIPTION
					SW	
30	YES	120	XX		SM	Silty fine SAND (SM), medium grey, moist, drills firm, old petroleum odor.
35	MOD	75	XX			
40	NO	1	XX		ML	SILT (ML), dark brown, slightly moist, drills firm, very dense.
45	NO	2	XX			
50	NO	0	XX			

*R = Refusal, greater than 100 blows/foot

Project: Harry's Automotive Service
1606 South Orange Avenue, Fresno, California

Boring No. 2
Project No. E90-166

DATE DRILLED: 10-11-90 TYPE OF BORING: 4 1/4" I.D. Hollow Stem Auger

HOLE ELEV: _____ GROUNDWATER LEVEL: _____ LOGGED BY: RH

Depth (Ft)	Odor	PID Reading	Undistrubed Sample	Graphic Log	Soil Classification	SOIL DESCRIPTION
30	NO	0	XX		ML	
						BOTTOM OF BORING
35						
40						
45						
50						

*R = Refusal, greater than 100 blows/foot

KRAZAN & ASSOCIATES, INC.

PROJECT: Harry's Automotive Center
1606 South Orange Avenue, Fresno, CA

Boring No. B-3
Project No. 014-05051

DATE DRILLED: August 10, 2005	TYPE OF BORING: Geoprobe Direct Push			
DRILLING EQUIPMENT: Geoprobe 6600	ELEVATION & DATUM:			LOGGED BY: Mark Edwards
SAMPLING METHOD: 1-inch Acetate Sleeves	DEPTH TO WATER:	FIRST:	COMPL.:	24 HRS:

Elevation Depth (Ft)	Odor	PID	Undisturbed Sample	Blow Count	Graphic Log	Soil Classification	SOIL DESCRIPTION
0						SM	Portland Cement.
							Silty SAND (SM); brown, moist, very dense, fine-grained sands.
10							
		147	XX				Hardpan. No PHC odor in soil sample. Slight PHC odor eminating from the borehole.
20						SP	SAND (SP); medium dense.
						ML	SILT (ML); greyish-brown, moist, very stiff, no PHC odor.
30		67	XX				
						SC	Clayey SAND (SC); brown, moist, very dense, fine-grained sands, no PHC odor.
40							
		101	XX				
50						SM	Silty SAND (SM); brown, moist, dense, fine-grained sands, no PHC odor.
		0	XX				
						SP	SAND (SP); reddish-brown, moist, dense, fine- to medium-grained sand, no PHC odor.
60		0	XX				BOTTOM OF BORING
70							

*R = Refusal, greater than 100 blows/foot

KRAZAN & ASSOCIATES, INC.

PROJECT: Harry's Automotive Center
1606 South Orange Avenue, Fresno, CA

Boring No. B-4
Project No. 014-05051

DATE DRILLED:	TYPE OF BORING:			
August 10, 2005	Geoprobe Direct Push			
DRILLING EQUIPMENT:	**ELEVATION & DATUM:**			**LOGGED BY:**
Geoprobe 6600				Mark Edwards
SAMPLING METHOD:	**DEPTH TO WATER:**	**FIRST:**	**COMPL.:**	**24 HRS:**
1-inch Acetate Sleeves				

Elevation Depth (Ft)	Odor	PID	Undisturbed Sample	Blow Count	Graphic Log	Soil Classification	SOIL DESCRIPTION
0						SM	Portland Cement.
							Silty SAND (SM); brown, moist, very dense, fine-grained sands.
10							
		0	XX				Hardpan. No PHC odor in soil sample.
20						SP	SAND (SP); medium dense.
						ML	SILT (ML); greyish-brown, moist, very stiff, no PHC odor.
30		0	XX				
						SC	Clayey SAND (SC); brown, moist, very dense, fine-grained sands, no PHC odor.
40							
		0	XX				
50						SM	Silty SAND (SM); brown, moist, dense, fine-grained sands, no PHC odor.
		0	XX				
						SP	SAND (SP); reddish-brown, moist, dense, fine- to medium-grained sand, no PHC odor.
60		0	XX				BOTTOM OF BORING
70							

*R = Refusal, greater than 100 blows/foot

KRAZAN & ASSOCIATES, INC.

PROJECT: Harry's Automotive Center
1606 South Orange Avenue, Fresno, CA

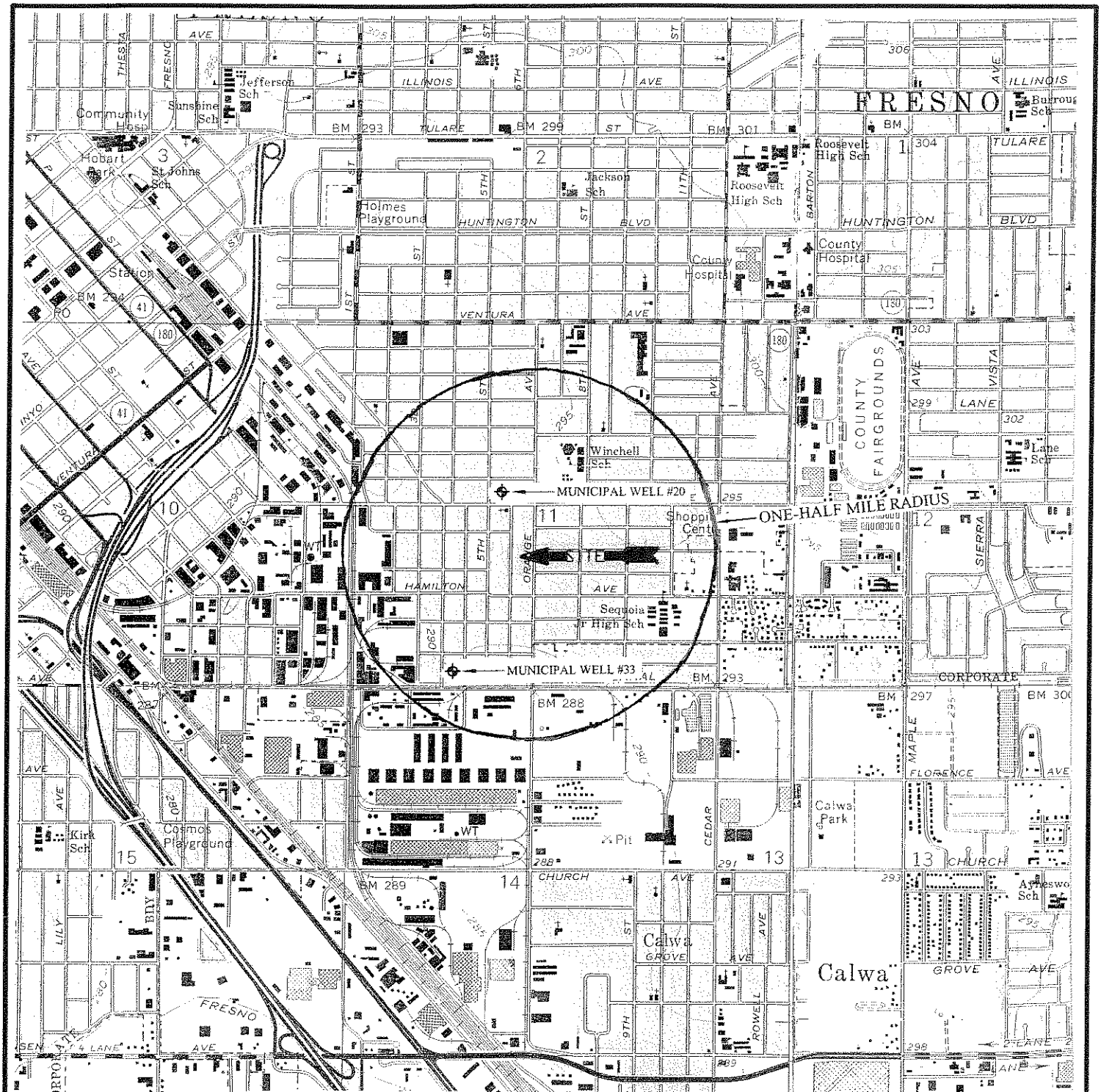
Boring No. B-5
Project No. 014-05051

DATE DRILLED: August 10, 2005	TYPE OF BORING: Geoprobe Direct Push		
DRILLING EQUIPMENT: Geoprobe 6600	ELEVATION & DATUM:		LOGGED BY: Mark Edwards
SAMPLING METHOD: 1-inch Acetate Sleeves	DEPTH TO WATER:	FIRST:	COMPL.: / 24 HRS:

Elevation Depth (Ft)	Odor	PID	Undisturbed Sample	Blow Count	Graphic Log	Soil Classification	SOIL DESCRIPTION
0						SM	Portland Cement. Silty SAND (SM); brown, moist, very dense, fine-grained sands.
10		0	XX				Hardpan. No PHC odor in soil sample.
20						SP	SAND (SP); medium dense.
30		0	XX			ML	SILT (ML); greyish-brown, moist, very stiff, no PHC odor.
40		0	XX			SC	Clayey SAND (SC); brown, moist, very dense, fine-grained sands, no PHC odor.
50		0	XX			SM	Silty SAND (SM); brown, moist, dense, fine-grained sands, no PHC odor.
60		0	XX			SP	SAND (SP); reddish-brown, moist, dense, fine- to medium-grained sand, no PHC odor.
70							BOTTOM OF BORING

*R = Refusal, greater than 100 blows/foot

KRAZAN & ASSOCIATES, INC.



MAP SOURCE:
7.5 MINUTE SERIES
U.S.G.S. TOPOGRAPHIC MAP
FRESNO SOUTH, CA
DATED 1963
PHOTOREVISED 1981
MUNICIPAL WELL LOCATIONS
BASED ON CITY OF FRESNO MAP
PRODUCED BY GLOBAL
MAP STORE CIRCA 2000

NORTH

0' 2000' 4000'

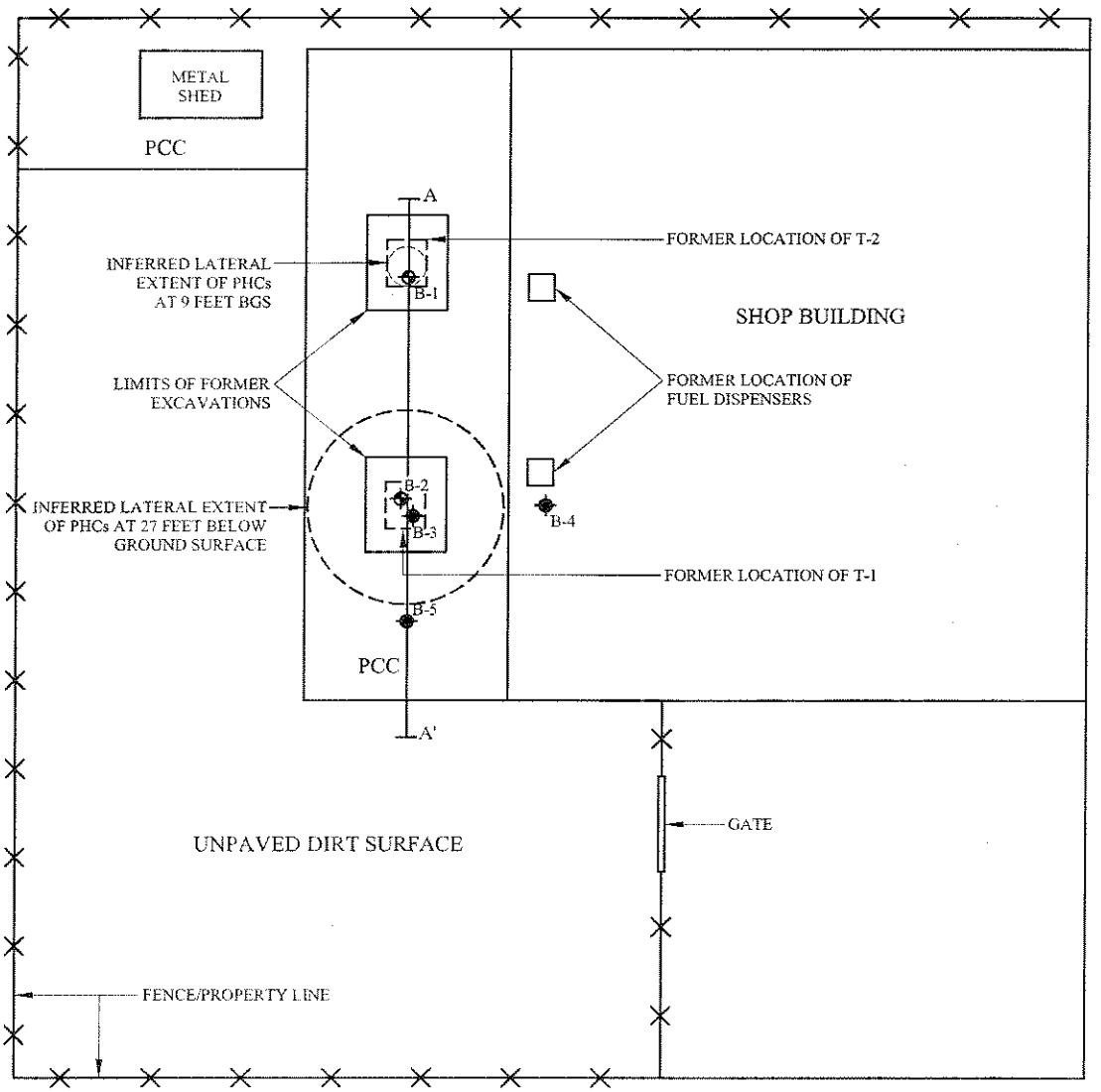
SCALE IN FEET (±)
*ALL LOCATIONS AND DIMENSIONS
ARE APPROXIMATE

VICINITY MAP WITH MUNICIPAL WATER WELL LOCATIONS WITHIN ONE-HALF MILE

HARRY'S AUTOMOTIVE SERVICE
1606 SOUTH ORANGE AVENUE
FRESNO, CALIFORNIA

Scale:	Date:
AS SHOWN	9/05
Drawn by:	Approved by:
A. L. F.	M. D. F.
Project No.	Figure No.
014-05051	1

Krazan
SITE DEVELOPMENT ENGINEERS
Offices Serving the Western United States



EXPLANATION

PHCs PETROLEUM HYDROCARBON CONSTITUENTS

PCC PORTLAND CEMENT CONCRETE

B-1 APPROXIMATE LOCATION OF KRAZAN'S 1990 SOIL BORING

B-3 APPROXIMATE LOCATION OF KRAZAN'S 2005 SOIL BORING

NORTH

0' 20' 40'

SCALE IN FEET (±)

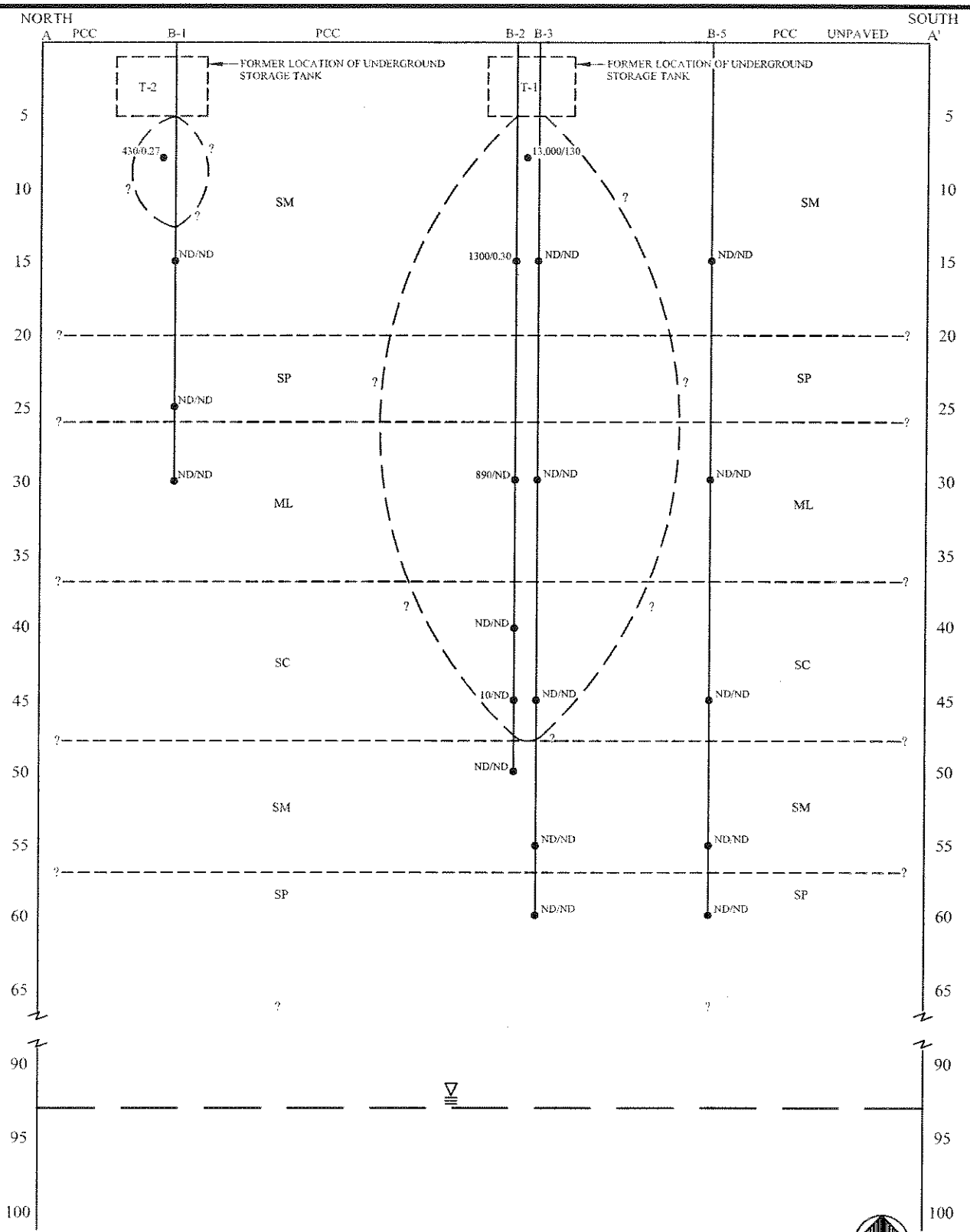
*ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE

SOIL BORING LOCATIONS MAP WITH TRACE OF GENERALIZED GEOLOGIC CROSS-SECTION A-A' AND INFERRED EXTENT OF PETROLEUM HYDROCARBONS

HARRY'S AUTOMOTIVE SERVICE
1606 SOUTH ORANGE AVENUE
FRESNO, CALIFORNIA

Scale:	Date:
AS SHOWN	9/05
Drawn by:	Approved by:
A. L. F.	M. D. E.
Project No.	Figure No.
014-05051	2

Krazan
SITE DEVELOPMENT ENGINEERS
Offices Serving the Western United States



EXPLANATION

— —	INFERRED EXTENT OF PETROLEUM HYDROCARBON CONSTITUENTS
– – –	INFERRED CONTACT BETWEEN GEOLOGICAL UNITS
13,000/130 ●	SOIL SAMPLES WITH CONCENTRATIONS OF TOTAL PETROLEUM HYDROCARBONS AS GASOLINE/BENZINE IN MILLIGRAMS PER KILOGRAM
B-1 |	APPROXIMATE LOCATION AND TRACE OF SOIL BORING B-1 AND B-2 KRAZAN 1990 B-3 AND B-5 KRAZAN 2005

PCC	PORTLAND CEMENT CONCRETE
SM	SILTY SAND
SP	SAND
ML	SILT
SC	CLAYEY SAND
▽	ESTIMATED DEPTH TO GROUNDWATER

0' 20' 40'

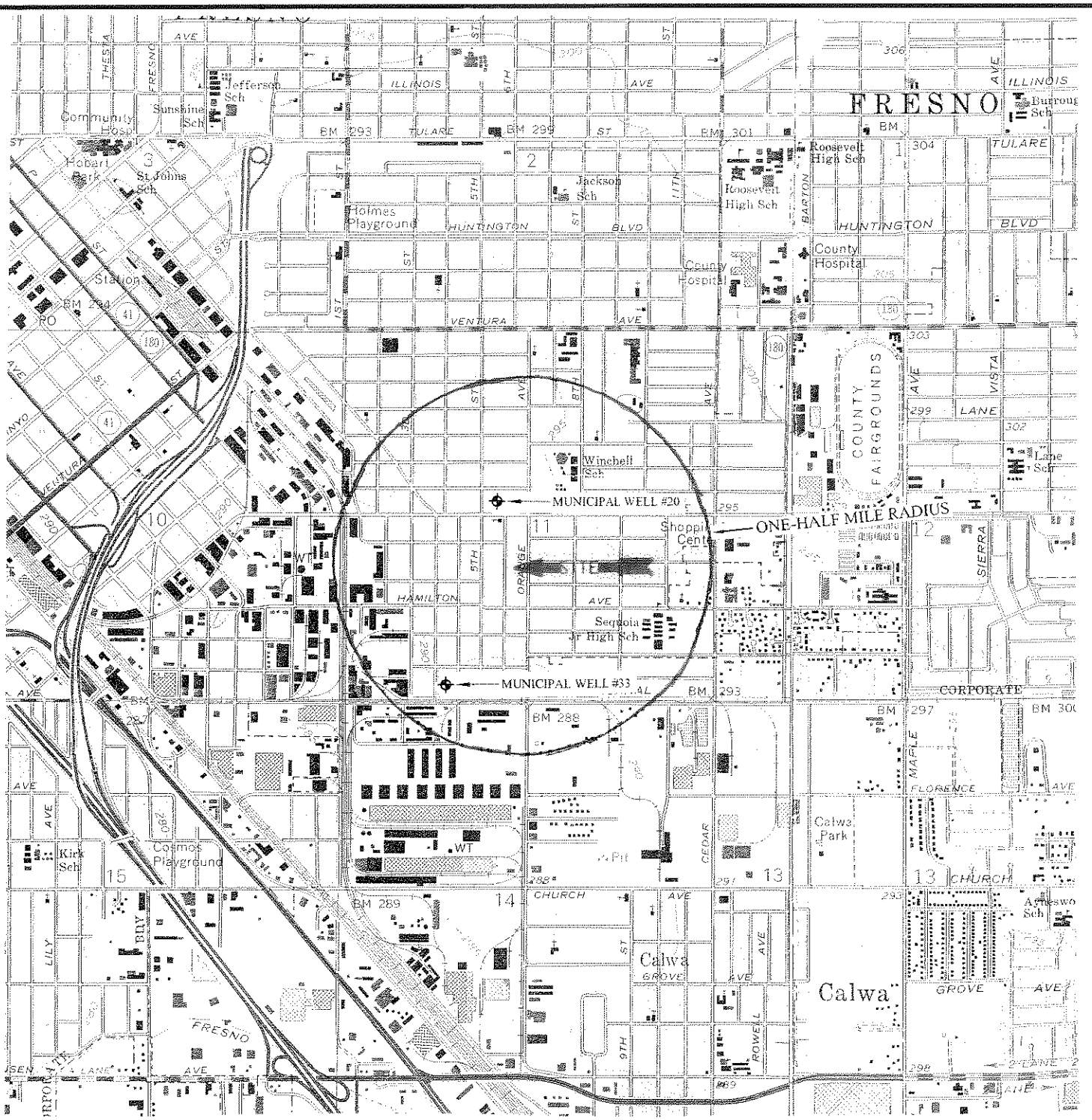
SCALE IN FEET (±)
*ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE

GEOLOGICAL CROSS-SECTION OF A-A' AND INFERRED EXTENT OF PETROLEUM HYDROCARBONS

HARRY'S AUTOMOTIVE SERVICE
1606 SOUTH ORANGE AVENUE
FRESNO, CALIFORNIA

Scale:	Date:
AS SHOWN	9/05
Drawn by:	Approved by:
A. L. F.	M. D. E.
Project No.	Figure No.
014-05051	3

Krazan
SITE DEVELOPMENT ENGINEERS
Offices Serving the Western United States



MAP SOURCE:
7.5 MINUTE SERIES
U.S.G.S. TOPOGRAPHIC MAP
FRESNO SOUTH, CA
DATED 1963
PHOTOREVISED 1981
MUNICIPAL WELL LOCATIONS
BASED ON CITY OF FRESNO MAP
PRODUCED BY GLOBAL
MAP STORE CIRCA 2000

SCALE IN FEET (±)
*ALL LOCATIONS AND DIMENSIONS
ARE APPROXIMATE

VICINITY MAP WITH MUNICIPAL WATER WELL LOCATIONS WITHIN ONE-HALF MILE

HARRY'S AUTOMOTIVE SERVICE
1606 SOUTH ORANGE AVENUE
FRESNO, CALIFORNIA

Scale:	Date:
AS SHOWN	9/05
Drawn by:	Approved by:
A. L. F.	M. D. E.
Project No.	Figure No.
014-05051	1

Krazan
SITE DEVELOPMENT ENGINEERS
Offices Serving the Western United States

SIERRA
ANALYTICAL

12 August 2005

Mark Edwards
Krazan & Associates, Inc.
215 West Dakota Avenue
Clovis, CA 93612

RE:Moomjian

Work Order No.: 0508250

Attached are the results of the analyses for samples received by the laboratory on 08/11/05 08:30.

The samples were received by Sierra Analytical Labs, Inc. with a chain of custody record attached or completed at the submittal of the samples.

The analyses were performed according to the prescribed method as outlined by EPA, Standard Methods, and A.S.T.M.

The remaining portions of the samples will be disposed of within 30 days from the date of this report.
If you require any additional retaining time, please advise us.

Sincerely,

Richard K. Forsyth

Laboratory Director

Sierra Analytical Labs, Inc. is certified by the California Department of Health Services (DOHS), Environmental Laboratory Accredidation Program (ELAP) No. 2320.

26052 Merit Circle Suite 105, Laguna Hills, California 92653
Telephone: (949) 348-9389 Fax: (949) 348-9115
E-Mail: sierralabs@earthlink.net

SIERRA ANALYTICAL

Krazan & Associates, Inc.	Project: Moomjian	
215 West Dakota Avenue	Project Number: 014-05051	**Reported:**
Clovis CA, 93612	Project Manager: Mark Edwards	08/12/05 11:26

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
B-3-15	0508250-01	Soil	08/10/05 07:44	08/11/05 08:30
B-3-30	0508250-02	Soil	08/10/05 07:44	08/11/05 08:30
B-3-45	0508250-03	Soil	08/10/05 08:20	08/11/05 08:30
B-3-55	0508250-04	Soil	08/10/05 08:45	08/11/05 08:30
B-3-60	0508250-05	Soil	08/10/05 09:13	08/11/05 08:30
B-4-15	0508250-06	Soil	08/10/05 09:45	08/11/05 08:30
B-4-30	0508250-07	Soil	08/10/05 10:00	08/11/05 08:30
B-4-45	0508250-08	Soil	08/10/05 10:25	08/11/05 08:30
B-4-55	0508250-09	Soil	08/10/05 10:47	08/11/05 08:30
B-4-60	0508250-10	Soil	08/10/05 11:10	08/11/05 08:30
B-5-15	0508250-11	Soil	08/10/05 11:45	08/11/05 08:30
B-5-30	0508250-12	Soil	08/10/05 12:00	08/11/05 08:30
B-5-45	0508250-13	Soil	08/10/05 12:30	08/11/05 08:30
B-5-55	0508250-14	Soil	08/10/05 12:47	08/11/05 08:30
B-5-60	0508250-15	Soil	08/10/05 13:05	08/11/05 08:30
R-1	0508250-16	Liquid	08/10/05 13:30	08/11/05 08:30

CASE NARRATIVE

SAMPLE RECEIPT:	Samples were received intact, at 4 °C, and accompanied by chain of custody documentation.
PRESERVATION:	Samples requiring preservation were verified prior to sample preparation and analysis.
HOLDING TIMES:	All holding times were met, unless otherwise noted in the report with data qualifiers.
QA/QC CRITERIA:	All quality objective criteria were met, except as noted in the report with data qualifiers.

SIERRA ANALYTICAL

Krazan & Associates, Inc.	Project: Moomjian	
215 West Dakota Avenue	Project Number: 014-05051	**Reported:**
Clovis CA, 93612	Project Manager: Mark Edwards	08/12/05 11:26

BTEX/MTBE/TVPH-Gasoline Range Hydrocarbons (C4-C12) by EPA Method 8021B and 8015B in series

Sierra Analytical Labs, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
B-3-15 (0508250-01) Soil Sampled: 08/10/05 07:44 Received: 08/11/05 08:30									
Benzene	ND	0.0030	mg/kg	1	B5H1125	08/11/05	08/11/05	EPA 8021B/8015B	
Toluene	ND	0.0030	"	"	"	"	"	"	
Ethylbenzene	ND	0.0030	"	"	"	"	"	"	
Xylenes (total)	ND	0.0030	"	"	"	"	"	"	
Methyl tert-butyl ether	ND	0.0050	"	"	"	"	"	"	
Gasoline Range Hydrocarbons (C4-C12)	ND	0.050	"	"	"	"	"	"	
Surrogate: a,a,a-Trifluorotoluene		*96.5 %*	*35-130*		"	"	"	"	
B-3-30 (0508250-02) Soil Sampled: 08/10/05 07:44 Received: 08/11/05 08:30									
Benzene	ND	0.0030	mg/kg	1	B5H1125	08/11/05	08/11/05	EPA 8021B/8015B	
Toluene	ND	0.0030	"	"	"	"	"	"	
Ethylbenzene	ND	0.0030	"	"	"	"	"	"	
Xylenes (total)	ND	0.0030	"	"	"	"	"	"	
Methyl tert-butyl ether	ND	0.0050	"	"	"	"	"	"	
Gasoline Range Hydrocarbons (C4-C12)	ND	0.050	"	"	"	"	"	"	
Surrogate: a,a,a-Trifluorotoluene		*95.0 %*	*35-130*		"	"	"	"	
B-3-45 (0508250-03) Soil Sampled: 08/10/05 08:20 Received: 08/11/05 08:30									
Benzene	ND	0.0030	mg/kg	1	B5H1125	08/11/05	08/11/05	EPA 8021B/8015B	
Toluene	ND	0.0030	"	"	"	"	"	"	
Ethylbenzene	ND	0.0030	"	"	"	"	"	"	
Xylenes (total)	ND	0.0030	"	"	"	"	"	"	
Methyl tert-butyl ether	ND	0.0050	"	"	"	"	"	"	
Gasoline Range Hydrocarbons (C4-C12)	ND	0.050	"	"	"	"	"	"	
Surrogate: a,a,a-Trifluorotoluene		*94.0 %*	*35-130*		"	"	"	"	

SIERRA ANALYTICAL

Krazan & Associates, Inc.	Project: Moomjian	
215 West Dakota Avenue	Project Number: 014-05051	**Reported:**
Clovis CA, 93612	Project Manager: Mark Edwards	08/12/05 11:26

BTEX/MTBE/TVPH-Gasoline Range Hydrocarbons (C4-C12) by EPA Method 8021B and 8015B in series

Sierra Analytical Labs, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
B-3-55 (0508250-04) Soil Sampled: 08/10/05 08:45 Received: 08/11/05 08:30									
Benzene	ND	0.0030	mg/kg	1	B5H1125	08/11/05	08/11/05	EPA 8021B/8015B	
Toluene	ND	0.0030	"	"	"	"	"	"	
Ethylbenzene	ND	0.0030	"	"	"	"	"	"	
Xylenes (total)	ND	0.0030	"	"	"	"	"	"	
Methyl tert-butyl ether	ND	0.0050	"	"	"	"	"	"	
Gasoline Range Hydrocarbons (C4-C12)	ND	0.050	"	"	"	"	"	"	
Surrogate: a,a,a-Trifluorotoluene		*91.0 %*	*35-130*		"	"	"	"	
B-3-60 (0508250-05) Soil Sampled: 08/10/05 09:13 Received: 08/11/05 08:30									
Benzene	ND	0.0030	mg/kg	1	B5H1125	08/11/05	08/11/05	EPA 8021B/8015B	
Toluene	ND	0.0030	"	"	"	"	"	"	
Ethylbenzene	ND	0.0030	"	"	"	"	"	"	
Xylenes (total)	ND	0.0030	"	"	"	"	"	"	
Methyl tert-butyl ether	ND	0.0050	"	"	"	"	"	"	
Gasoline Range Hydrocarbons (C4-C12)	ND	0.050	"	"	"	"	"	"	
Surrogate: a,a,a-Trifluorotoluene		*89.5 %*	*35-130*		"	"	"	"	
B-4-15 (0508250-06) Soil Sampled: 08/10/05 09:45 Received: 08/11/05 08:30									
Benzene	ND	0.0030	mg/kg	1	B5H1125	08/11/05	08/11/05	EPA 8021B/8015B	
Toluene	ND	0.0030	"	"	"	"	"	"	
Ethylbenzene	ND	0.0030	"	"	"	"	"	"	
Xylenes (total)	ND	0.0030	"	"	"	"	"	"	
Methyl tert-butyl ether	ND	0.0050	"	"	"	"	"	"	
Gasoline Range Hydrocarbons (C4-C12)	ND	0.050	"	"	"	"	"	"	
Surrogate: a,a,a-Trifluorotoluene		*93.5 %*	*35-130*		"	"	"	"	

SIERRA ANALYTICAL

Krazan & Associates, Inc.	Project: Moomjian	
215 West Dakota Avenue	Project Number: 014-05051	**Reported:**
Clovis CA, 93612	Project Manager: Mark Edwards	08/12/05 11:26

BTEX/MTBE/TVPH-Gasoline Range Hydrocarbons (C4-C12) by EPA Method 8021B and 8015B in series

Sierra Analytical Labs, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
B-4-30 (0508250-07) Soil Sampled: 08/10/05 10:00 Received: 08/11/05 08:30									
Benzene	ND	0.0030	mg/kg	1	B5H1125	08/11/05	08/11/05	EPA 8021B/8015B	
Toluene	ND	0.0030	"	"	"	"	"	"	
Ethylbenzene	ND	0.0030	"	"	"	"	"	"	
Xylenes (total)	ND	0.0030	"	"	"	"	"	"	
Methyl tert-butyl ether	ND	0.0050	"	"	"	"	"	"	
Gasoline Range Hydrocarbons (C4-C12)	ND	0.050	"	"	"	"	"	"	
Surrogate: a,a,a-Trifluorotoluene		*94.0 %*	*35-130*		"	"	"	"	
B-4-45 (0508250-08) Soil Sampled: 08/10/05 10:25 Received: 08/11/05 08:30									
Benzene	ND	0.0030	mg/kg	1	B5H1125	08/11/05	08/11/05	EPA 8021B/8015B	
Toluene	ND	0.0030	"	"	"	"	"	"	
Ethylbenzene	ND	0.0030	"	"	"	"	"	"	
Xylenes (total)	ND	0.0030	"	"	"	"	"	"	
Methyl tert-butyl ether	ND	0.0050	"	"	"	"	"	"	
Gasoline Range Hydrocarbons (C4-C12)	ND	0.050	"	"	"	"	"	"	
Surrogate: a,a,a-Trifluorotoluene		*95.0 %*	*35-130*		"	"	"	"	
B-4-55 (0508250-09) Soil Sampled: 08/10/05 10:47 Received: 08/11/05 08:30									
Benzene	ND	0.0030	mg/kg	1	B5H1125	08/11/05	08/11/05	EPA 8021B/8015B	
Toluene	ND	0.0030	"	"	"	"	"	"	
Ethylbenzene	ND	0.0030	"	"	"	"	"	"	
Xylenes (total)	ND	0.0030	"	"	"	"	"	"	
Methyl tert-butyl ether	ND	0.0050	"	"	"	"	"	"	
Gasoline Range Hydrocarbons (C4-C12)	ND	0.050	"	"	"	"	"	"	
Surrogate: a,a,a-Trifluorotoluene		*95.0 %*	*35-130*		"	"	"	"	

SIERRA ANALYTICAL

Krazan & Associates, Inc.	Project: Moomjian	
215 West Dakota Avenue	Project Number: 014-05051	**Reported:**
Clovis CA, 93612	Project Manager: Mark Edwards	08/12/05 11:26

BTEX/MTBE/TVPH-Gasoline Range Hydrocarbons (C4-C12) by EPA Method 8021B and 8015B in series

Sierra Analytical Labs, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
B-4-60 (0508250-10) Soil Sampled: 08/10/05 11:10 Received: 08/11/05 08:30									
Benzene	ND	0.0030	mg/kg	1	B5H1125	08/11/05	08/11/05	EPA 8021B/8015B	
Toluene	ND	0.0030	"	"	"	"	"	"	
Ethylbenzene	ND	0.0030	"	"	"	"	"	"	
Xylenes (total)	ND	0.0030	"	"	"	"	"	"	
Methyl tert-butyl ether	ND	0.0050	"	"	"	"	"	"	
Gasoline Range Hydrocarbons (C4-C12)	ND	0.050	"	"	"	"	"	"	
Surrogate: a,a,a-Trifluorotoluene		*94.0 %*	*35-130*		"	"	"	"	
B-5-15 (0508250-11) Soil Sampled: 08/10/05 11:45 Received: 08/11/05 08:30									
Benzene	ND	0.0030	mg/kg	1	B5H1125	08/11/05	08/11/05	EPA 8021B/8015B	
Toluene	ND	0.0030	"	"	"	"	"	"	
Ethylbenzene	ND	0.0030	"	"	"	"	"	"	
Xylenes (total)	ND	0.0030	"	"	"	"	"	"	
Methyl tert-butyl ether	ND	0.0050	"	"	"	"	"	"	
Gasoline Range Hydrocarbons (C4-C12)	ND	0.050	"	"	"	"	"	"	
Surrogate: a,a,a-Trifluorotoluene		*94.5 %*	*35-130*		"	"	"	"	
B-5-30 (0508250-12) Soil Sampled: 08/10/05 12:00 Received: 08/11/05 08:30									
Benzene	ND	0.0030	mg/kg	1	B5H1125	08/11/05	08/11/05	EPA 8021B/8015B	
Toluene	ND	0.0030	"	"	"	"	"	"	
Ethylbenzene	ND	0.0030	"	"	"	"	"	"	
Xylenes (total)	ND	0.0030	"	"	"	"	"	"	
Methyl tert-butyl ether	ND	0.0050	"	"	"	"	"	"	
Gasoline Range Hydrocarbons (C4-C12)	ND	0.050	"	"	"	"	"	"	
Surrogate: a,a,a-Trifluorotoluene		*96.0 %*	*35-130*		"	"	"	"	

SIERRA ANALYTICAL

Krazan & Associates, Inc.	Project: Moomjian	
215 West Dakota Avenue	Project Number: 014-05051	**Reported:**
Clovis CA, 93612	Project Manager: Mark Edwards	08/12/05 11:26

BTEX/MTBE/TVPH-Gasoline Range Hydrocarbons (C4-C12) by EPA Method 8021B and 8015B in series

Sierra Analytical Labs, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
B-5-45 (0508250-13) Soil Sampled: 08/10/05 12:30 Received: 08/11/05 08:30									
Benzene	ND	0.0030	mg/kg	1	B5H1125	08/11/05	08/11/05	EPA 8021B/8015B	
Toluene	ND	0.0030	"	"	"	"	"	"	
Ethylbenzene	ND	0.0030	"	"	"	"	"	"	
Xylenes (total)	ND	0.0030	"	"	"	"	"	"	
Methyl tert-butyl ether	ND	0.0050	"	"	"	"	"	"	
Gasoline Range Hydrocarbons (C4-C12)	ND	0.050	"	"	"	"	"	"	
Surrogate: a,a,a-Trifluorotoluene		*93.5 %*	*35-130*		"	"	"	"	
B-5-55 (0508250-14) Soil Sampled: 08/10/05 12:47 Received: 08/11/05 08:30									
Benzene	ND	0.0030	mg/kg	1	B5H1125	08/11/05	08/11/05	EPA 8021B/8015B	
Toluene	ND	0.0030	"	"	"	"	"	"	
Ethylbenzene	ND	0.0030	"	"	"	"	"	"	
Xylenes (total)	ND	0.0030	"	"	"	"	"	"	
Methyl tert-butyl ether	ND	0.0050	"	"	"	"	"	"	
Gasoline Range Hydrocarbons (C4-C12)	ND	0.050	"	"	"	"	"	"	
Surrogate: a,a,a-Trifluorotoluene		*90.0 %*	*35-130*		"	"	"	"	
B-5-60 (0508250-15) Soil Sampled: 08/10/05 13:05 Received: 08/11/05 08:30									
Benzene	ND	0.0030	mg/kg	1	B5H1125	08/11/05	08/11/05	EPA 8021B/8015B	
Toluene	ND	0.0030	"	"	"	"	"	"	
Ethylbenzene	ND	0.0030	"	"	"	"	"	"	
Xylenes (total)	ND	0.0030	"	"	"	"	"	"	
Methyl tert-butyl ether	ND	0.0050	"	"	"	"	"	"	
Gasoline Range Hydrocarbons (C4-C12)	ND	0.050	"	"	"	"	"	"	
Surrogate: a,a,a-Trifluorotoluene		*93.5 %*	*35-130*		"	"	"	"	

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

SIERRA ANALYTICAL

Krazan & Associates, Inc.	Project: Moomjian	
215 West Dakota Avenue	Project Number: 014-05051	**Reported:**
Clovis CA, 93612	Project Manager: Mark Edwards	08/12/05 11:26

BTEX/MTBE/TVPH-Gasoline Range Hydrocarbons (C4-C12) by EPA Method 8021B and 8015B in series

Sierra Analytical Labs, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
R-1 (0508250-16) Liquid Sampled: 08/10/05 13:30 Received: 08/11/05 08:30									
Benzene	ND	0.50	µg/L	1	B5H1126	08/11/05	08/11/05	EPA 8021B/8015B	
Toluene	ND	0.50	"	"	"	"	"	"	
Ethylbenzene	ND	0.50	"	"	"	"	"	"	
Xylenes (total)	ND	0.50	"	"	"	"	"	"	
Methyl tert-butyl ether	ND	5.0	"	"	"	"	"	"	
Gasoline Range Hydrocarbons (C4-C12)	ND	50	"	"	"	"	"	"	
Surrogate: a,a,a-Trifluorotoluene		*91.0 %*		*70-125*	"	"	"	"	

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

SIERRA ANALYTICAL

Krazan & Associates, Inc.	Project: Moomjian	
215 West Dakota Avenue	Project Number: 014-05051	**Reported:**
Clovis CA, 93612	Project Manager: Mark Edwards	08/12/05 11:26

BTEX/MTBE/TVPH-Gasoline Range Hydrocarbons (C4-C12) by EPA Method 8021B and 8015B in series - Quality Control

Sierra Analytical Labs, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B5H1125 - EPA 5035 P & T										
Blank (B5H1125-BLK1)				Prepared & Analyzed: 08/11/05						
Benzene	ND	0.0030	mg/kg							
Toluene	ND	0.0030	"							
Ethylbenzene	ND	0.0030	"							
Xylenes (total)	ND	0.0030	"							
Methyl tert-butyl ether	ND	0.0050	"							
Gasoline Range Hydrocarbons (C4-C12)	ND	0.050	"							
Surrogate: a,a,a-Trifluorotoluene	*0.0195*		"	*0.0200*		*97.5*	*35-130*			
LCS (B5H1125-BS1)				Prepared & Analyzed: 08/11/05						
Benzene	0.0354	0.0030	mg/kg	0.0400		88.5	80-120			
Toluene	0.0384	0.0030	"	0.0400		96.0	80-120			
Ethylbenzene	0.0385	0.0030	"	0.0400		96.2	80-120			
Gasoline Range Hydrocarbons (C4-C12)	0.686	0.050	"	0.600		114	80-120			
Matrix Spike (B5H1125-MS1)		**Source: 0508250-15**		Prepared & Analyzed: 08/11/05						
Benzene	0.0353	0.0030	mg/kg	0.0400	ND	88.3	39-150			
Toluene	0.0381	0.0030	"	0.0400	ND	95.2	46-148			
Ethylbenzene	0.0382	0.0030	"	0.0400	ND	95.5	32-160			
Gasoline Range Hydrocarbons (C4-C12)	0.695	0.050	"	0.600	ND	116	50-150			
Matrix Spike Dup (B5H1125-MSD1)		**Source: 0508250-15**		Prepared & Analyzed: 08/11/05						
Benzene	0.0375	0.0030	mg/kg	0.0400	ND	93.8	39-150	6.04	30	
Toluene	0.0404	0.0030	"	0.0400	ND	101	46-148	5.86	30	
Ethylbenzene	0.0410	0.0030	"	0.0400	ND	102	32-160	7.07	30	
Gasoline Range Hydrocarbons (C4-C12)	0.636	0.050	"	0.600	ND	106	50-150	8.87	30	
Batch B5H1126 - EPA 5030B P & T										
Blank (B5H1126-BLK1)				Prepared & Analyzed: 08/11/05						
Benzene	ND	0.50	µg/L							
Toluene	ND	0.50	"							
Ethylbenzene	ND	0.50	"							
Xylenes (total)	ND	0.50	"							
Methyl tert-butyl ether	ND	5.0	"							
Gasoline Range Hydrocarbons (C4-C12)	ND	50	"							
Surrogate: a,a,a-Trifluorotoluene	*19.5*		"	*20.0*		*97.5*	*70-125*			

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SIERRA ANALYTICAL

Krazan & Associates, Inc.	Project: Moomjian	
215 West Dakota Avenue	Project Number: 014-05051	**Reported:**
Clovis CA, 93612	Project Manager: Mark Edwards	08/12/05 11:26

BTEX/MTBE/TVPH-Gasoline Range Hydrocarbons (C4-C12) by EPA Method 8021B and 8015B in series - Quality Control

Sierra Analytical Labs, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B5H1126 - EPA 5030B P & T										
LCS (B5H1126-BS1)				Prepared & Analyzed: 08/11/05						
Benzene	35.4	0.50	µg/L	40.0		88.5	80-120			
Toluene	38.4	0.50	"	40.0		96.0	80-120			
Ethylbenzene	38.5	0.50	"	40.0		96.2	80-120			
Gasoline Range Hydrocarbons (C4-C12)	686	50	"	600		114	80-120			
Matrix Spike (B5H1126-MS1)		**Source: 0508250-16**		Prepared & Analyzed: 08/11/05						
Benzene	34.8	0.50	µg/L	40.0	ND	87.0	39-150			
Toluene	37.6	0.50	"	40.0	ND	94.0	46-148			
Ethylbenzene	37.5	0.50	"	40.0	ND	93.8	32-160			
Gasoline Range Hydrocarbons (C4-C12)	674	50	"	600	ND	112	50-150			
Matrix Spike Dup (B5H1126-MSD1)		**Source: 0508250-16**		Prepared & Analyzed: 08/11/05						
Benzene	37.2	0.50	µg/L	40.0	ND	93.0	39-150	6.67	30	
Toluene	40.2	0.50	"	40.0	ND	100	46-148	6.68	30	
Ethylbenzene	40.5	0.50	"	40.0	ND	101	32-160	7.69	30	
Gasoline Range Hydrocarbons (C4-C12)	639	50	"	600	ND	106	50-150	5.33	30	

26052 Merit Circle Suite 105, Laguna Hills, California 92653
Telephone: (949) 348-9389 Fax: (949) 348-9115
E-Mail: sierralabs @ sierralabs.net

SIERRA ANALYTICAL

Krazan & Associates, Inc.	Project: Moomjian	
215 West Dakota Avenue	Project Number: 014-05051	**Reported:**
Clovis CA, 93612	Project Manager: Mark Edwards	08/12/05 11:26

Notes and Definitions

DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference

Krazan RUSH

CHAIN-OF-CUSTODY RECORD

DATE: 8/10/05 PAGE 1 OF 2

KRAZAN & ASSOCIATES, INC.
215 WEST DAKOTA AVENUE
CLOVIS, CA 93612
(559) 348-2200 VOICE
(559) 348-2201 FAX

Comments: IF MTBE IS DETECTED DIS CONFIRM BY 8260. WILL EVENTUALLY GO INTO GEOTRACKER

Project No.: 01405051

Project Name: (optional) MOOMJIAN

Sampler Name (Printed): MARK EDWARDS

Report Attention: MARK E.

P.O. Number: 0508250

Ice Chest No.:

Laboratory: Sierra

Lab Quote No.:

Method of Shipment/Delivery: CalOvernight

Lab Sample ID #	Krazan Sample No.	Date Sampled	Time Sampled	Sample Description	Sample Matrix W=Water S=Soil A=Air O=Other	Sample Type G=Grab C=Composite D=Discrete	Sample Preserved? (Yes/No)	Number of Containers	BTEX/TPH-Gasoline/MTBE	TPH-Diesel	TRPH by EPA 418.1	EPA 525.2 (Pentachlorophenol/Creosote)	EPA 8280 (Dioxins/Furans)	Remarks
01	B-3-15	8/10	744		S	D	N	1	X					
02	B-3-30		755						X					
03	B-3-45		820						X					
04	B-3-55		845						X					24 hour
05	B-3-60		913						X					24 hour
06	B-4-15		945						X					
07	B-4-30		1000						X					
08	B-4-45		1025						X					
09	B-4-55		1047						X					
10	B-4-60		1110						X					
11	B-5-15		1145						X					
12	B-5-30		1200						X					
13	B-5-45		1230						X					
14	B-5-55		1247						X					
15	B-5-60		105						X					

	Signature	Printed Name	Date	Time	Company Name
Relinquished by:		MARK EDWARDS	8/10/05	400 am/pm	
Received by:				am pm	
Relinquished by:				am pm	
Received by:				am pm	
Relinquished by:				am pm	
Received for Laboratory by:		DEREK KLEFFER	8.11.05	830 am/pm	Sierra Anal

15 Total Number of Containers Submitted to Laboratory

Turn Around Time (Circle Choice)

24 Hrs. 48 Hrs.

5 Days 10 Days

As Contracted

White - Lab Yellow - Project File Pink - C.O.C. Binder

~~GOC5 VSD 02-01-01~~

B-31-R3A

Krazan

CHAIN-OF-CUSTODY RECORD

DATE: 8/10/05 PAGE 1 OF 1

KRAZAN & ASSOCIATES, INC.
215 WEST DAKOTA AVENUE
CLOVIS, CA 93612
(559) 348-2200 VOICE
(559) 348-2201 FAX

Comments:

Project No.: 04050051

Project Name: (optional) MOUNTJOY

Sampler Name (Printed): MARK EDWARDS

Report Attention: MARK E.

REQUESTED ANALYSES

P.O. Number: 0508250

Ice Chest No.:

Laboratory: Sierra

Lab Quote No.:

Method of Shipment/Delivery: CalOvernight

Lab Sample ID #	Krazan Sample No.	Date Sampled	Time Sampled	Sample Description	Sample Matrix W=Water S=Soil A=Air O=Other	Sample Type G=Grab C=Composite D=Discrete	Sample Preserved? (Yes/No)	Number of Containers	BTEX/TPH-Gasoline/MTBE	TPH-Diesel	TRPH by EPA 418.1	EPA 525.2 (Pentachlorophenol/Creosote)	EPA 8280 (Dioxins/Furans)	Remarks
16	R-1	8/10	1330	RESIDATE	W	G	Y	2	X					

Signature	Printed Name	Date	Time	Company Name
Relinquished by:	MARK EDWARDS	8/10	1400 am/pm	
Received by:			am pm	
Relinquished by:			am pm	
Received by:			am pm	
Relinquished by:			am pm	
Received for Laboratory by:	DEREK RIEFFER	8-11-05	8:30 am/pm	Sierra

2 Total Number of Containers Submitted to Laboratory

Turn Around Time (Circle Choice)

24 Hrs. 48 Hrs.

5 Days 10 Days

As Contracted

White - Lab Yellow - Project File Pink - C.O.C. Binder

COC5.VSD 02-01-01

4.0 R3A

RBCA SITE ASSESSMENT | **Baseline Risk Summary-All Pathways**

Site Name: Harry's Automotive, T-1
Site Location: 1606 S. Orange Ave., Fresno, CA

Completed By: J. Noel
Date Completed: 19-Sep-05

TIER 2 BASELINE RISK SUMMARY TABLE

EXPOSURE PATHWAY	BASELINE CARCINOGENIC RISK					BASELINE TOXIC EFFECTS				
	Individual COC Risk		Cumulative COC Risk		Risk Limit(s) Exceeded?	Hazard Quotient		Hazard Index		Toxicity Limit(s) Exceeded?
	Maximum Value	Target Risk	Total Value	Target Risk		Maximum Value	Applicable Limit	Total Value	Applicable Limit	
OUTDOOR AIR EXPOSURE PATHWAYS										
Complete:	1.3E-7	1.0E-6	1.3E-7	1.0E-5	☐	7.4E-1	1.0E+0	7.5E-1	1.0E+0	☐
INDOOR AIR EXPOSURE PATHWAYS										
Complete:	8.8E-5	1.0E-6	8.8E-5	1.0E-5	■	5.1E+2	1.0E+0	5.1E+2	1.0E+0	■
SOIL EXPOSURE PATHWAYS										
Complete:	NA	NA	NA	NA	☐	NA	NA	NA	NA	☐
GROUNDWATER EXPOSURE PATHWAYS										
Complete:	NA	NA	NA	NA	☐	NA	NA	NA	NA	☐
SURFACE WATER EXPOSURE PATHWAYS										
Complete:	NA	NA	NA	NA	☐	NA	NA	NA	NA	☐
CRITICAL EXPOSURE PATHWAY (Maximum Values From Complete Pathways)										
	8.8E-5	*1.0E-6*	*8.8E-5*	*1.0E-5*	■	*5.1E+2*	*1.0E+0*	*5.1E+2*	*1.0E+0*	■
	Indoor Air		*Indoor Air*			*Indoor Air*		*Indoor Air*		

Main Screen

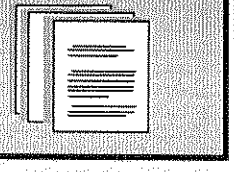
RBCA Tool Kit for Chemical Releases
Version 1.3b © 2000

1. Project Information

Site Name:	Harry's Automotive, T-1		
Location:	1606 S. Orange Ave., Fresno, CA		
Compl. By:	J. Noel		
Date:	19-Sep-05	Job ID:	014-05051

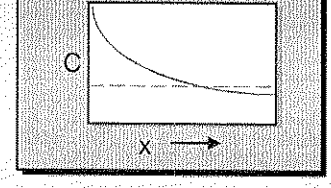
2. Which Type of RBCA Analysis?

○ Tier 1



Generic Values
On-Site
Exposure

◉ Tier 2



Site-Specific Values
On- or Off-Site Exposure

3. Calculation Options

Affects which input data are required

☑ ***Baseline Risks (Forward mode)***

☐ ***RBCA Cleanup Standards (Backward mode)***

4. RBCA Evaluation Process

Prepare Input Data	*Review Output*
Data Complete? (■= yes, ■= no)	
■□ Exposure Pathways	Exposure Flowchart
■□ Constituents of Concern (COCs)	COC Chem. Parameters
■□ Transport Models	Input Data Summary
■□ Soil Parameters	User-Spec. COC Data...
GW Parameters	Transient Dilution Analysis...
■□ Air Parameters	Baseline Risks...
	Cleanup Standards...

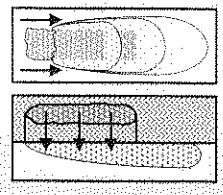
5. Commands and Options

New Site	Load Data...	Save Data As...	Quit
Print Sheet	Set Units	Custom Chem. Data...	*Help*

Exposure Pathway Identification

Site Name: Harry's Automotive, T-1
Location: 1606 S. Orange Ave., Fresno, CA
Compl. By: J. Noel
Job ID: 014-05051 Date: 19-Sep-05

1. Groundwater Exposure

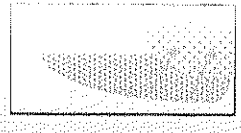


Groundwater Ingestion/ Surface Water Impact

Receptor	None	None	None
Type:	On-site	Off-site1	Off-site2

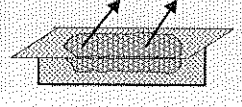
Source Media:

- [ ] Affected Groundwater — Distance to GW receptors: 0 (ft) | 0 (ft) | 0 (ft)
- [ ] Affected Soils Leaching to Groundwater — 0 (ft) | 0 (ft) | 0 (ft)



- [ ] Human Consumption
- [ ] Aquatic Life Protection
- [ ] Default Target Levels

2. Surface Soil Exposure

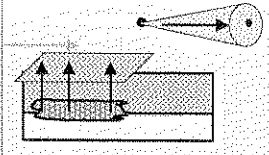


Direct Ingestion and Dermal Contact

Receptor	None	No off-site receptors
Type:	On-site	

Construction Worker: ☐

3. Air Exposure

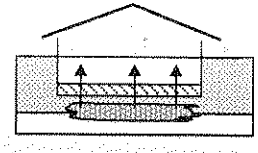


Volatilization and Particulates to Outdoor Air Inhalation

Receptor	Com.	None	None
Type:	On-site	Off-site1	Off-site2
	0	0	0 (ft)

Construction worker ☐

- [x] Affected Soils--Volatilization to Ambient Outdoor Air
- [ ] Affected Groundwater--Volatilization to Ambient Outdoor Air
- [ ] Affected Surface Soils--Particulates to Ambient Outdoor Air



Volatilization to Indoor Air Inhalation

Receptor	Com.	No off-site receptors
Type:	On-site	

- [x] Affected Soils--Volatilization to Enclosed Space
- [ ] Affected Groundwater--Volatilization to Enclosed Space

4. Commands and Options

Main Screen | Print Sheet | Set Units | Help

Exposure Factors & Target Risks | Exposure Flowchart

Site Name: Harry's Automotive, T-1 | Job ID: 014-05051
Location: 1606 S. Orange Ave., Fresno, CA | Date: 19-Sep-05
Compl. By: J. Noel

Commands and Options

Main Screen | Print Sheet | *Help*

Source Media Constituents of Concern (COCs)

Apply Raoult's Law ?

Selected COCs

COC Select: | Sort List: ?

Add/Insert | Top | MoveUp
Delete | Bottom | MoveDown

- Benzene
- Toluene
- Ethylbenzene
- Xylene (mixed isomers)
- TPH - Arom >C05-C07

Representative COC Concentration ?

Groundwater Source Zone

Calculate | Enter Site Data

(mg/L)	note

Soil Source Zone

Calculate | Enter Site Data

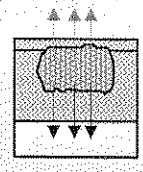
(mg/kg)	note
1.4E+1	
4.3E+1	
5.9E+1	
4.5E+2	
1.7E+3	

(-)

Transport Modeling Options

Site Name: Harry's Automotive, T-1 | Job ID: 014-05051
Location: 1606 S. Orange Ave., Fresno, CA | Date: 19-Sep-05
Compl. By: J. Noel

1. Vertical Transport, Surface Soil Column



Outdoor Air Volatilization Factors

- ○ Surface soil volatilization model only
- ◉ Combination surface soil/Johnson & Ettinger models
  Thickness of surface soil zone: 2 (ft)
- ○ User-specified VF from other model — Enter VF Values

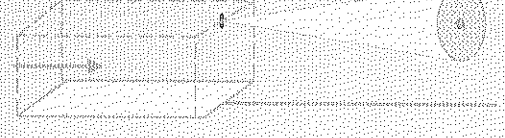
Indoor Air Volatilization Factors

- ◉ Johnson & Ettinger model
- ○ User-specified VF from other model — Enter VF Values

Soil-to-Groundwater Leaching Factor

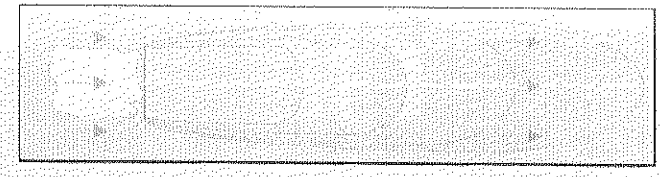
- ○ — Enter Decay Rates
- ○ User-specified LF from other model — Enter LF Values

2. Lateral Air Dispersion Factor



- ○ 3-D Gaussian dispersion model — Off-site 1: 1.00E+0 — Off-site 2: 1.00E+0 (-)
- ○ User-Specified ADF

3. Groundwater Dilution Attenuation Factor



Calculate DAF using Domenico Model

- ○ Domenico equation with dispersion only (no biodegradation)
- ○ Domenico equation first-order decay — Enter Decay Rates
- ○ Modified Domenico equation (e.g. — Enter Site Data
  Enter Directly

— or —

User-Specified DAF Values

- ○ DAF values from other model or site data — Enter DAF Values

4. Commands and Options

Main Screen | Print Sheet | Help

Site-Specific Soil Parameters

Site Name: Harry's Automotive, T-1 | Job ID: 014-05051
Location: 1606 S. Orange Ave., Fresno, CA | Date: 19-Sep-05
Compl. By: J. Noel

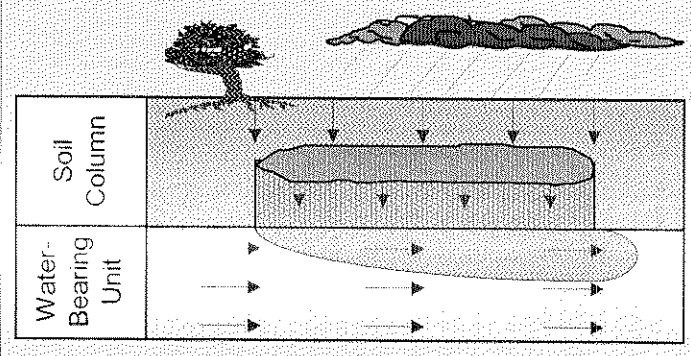
1. Soil Source Zone Characteristics

Hydrogeology — General Case Construction

Depth to water-bearing unit	9.842519685	(ft)
Capillary zone thickness	0	(ft)
Soil column thickness	9.842519685	(ft)

Affected Soil Zone

Depth to top of affected soils	9		(ft)
Depth to base of affected soils	45		(ft)
Affected soil area	177	177	(ft^2)
Length of affected soil parallel to assumed wind direction	15	15	(ft)
Length of affected soil parallel to assumed GW flow direction			(ft)



2. Surface Soil Column

Vadose Zone | Capillary Fringe

Predominant USCS Soil Type

or Calculate

	Vadose Zone	Capillary Fringe	
	or		
Total porosity	0.25		(-)
Volumetric water content	0.15	0.15	(-)
Volumetric air content	0.1	0.1	(-)
Dry bulk density	1.7		(kg/L)
Vertical hydraulic conductivity	8.6E-1		(cm/d)
Vapor permeability	1.1E-14		(ft^2)
Capillary zone thickness	0.0E+0		(ft)

Net Rainfall Infiltration

Net infiltration estimate: (cm/yr)
or Calculate — or
Average annual precipitation: (cm/yr)

Partitioning Parameters

Fraction organic carbon	0.02	(-)
Soil/water pH	7.2	(-)

3. Commands and Options

Main Screen | Use Default Values | Print Sheet
Set Units | | Help

Site-Specific Air Parameters

Site Name: Harry's Automotive, T-1 | Job ID: 014-05051
Location: 1606 S. Orange Ave., Fresno, CA | Date: 19-Sep-05
Compl. By: J. Noel

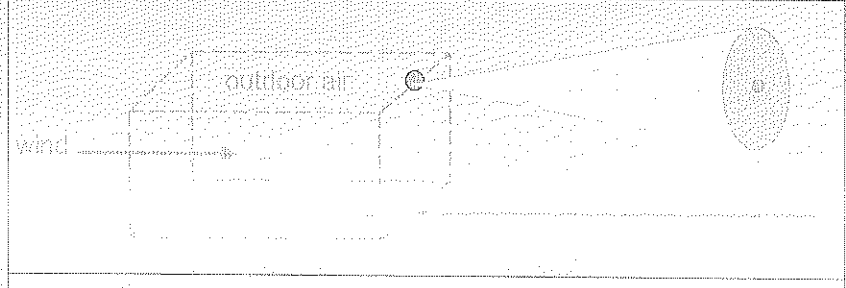
1. Outdoor Air Pathway

Dispersion in Air

	Off-site 1	Off-site 2	
Distance to offsite air receptor			(ft)
or		or	
Horizontal dispersivity			(ft)
Vertical dispersivity			(ft)

Air Source Zone

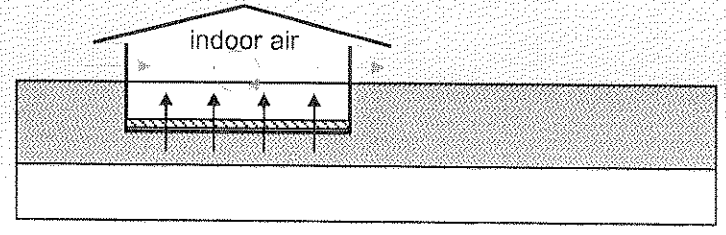
Air mixing zone height	6.56167979	(ft)
Ambient air velocity in mixing zone	7.381889764	(ft/s)
Areal particulate emission flux	6.9E-14	(g/cm^2/s)



2. Indoor Air Pathway

Building Parameters

	Residential	Commercial	
Building volume/area ratio	6.56168	10	(ft)
Foundation area	753.474	4200	(ft^2)
Foundation perimeter	111.549	260	(ft)
Building air exchange rate		2.3E-4	(1/s)
Depth to bottom of foundation slab		0.49213	(ft)
Convective air flow through cracks		0.0E+0	(ft^3/s)
Foundation thickness	0.492125984		(ft)
Foundation crack fraction	0.005		(-)
Volumetric water content of cracks	0.12		(-)
Volumetric air content of cracks	0.26		(-)
Indoor/Outdoor differential pressure	0		(g/cm/s^2)

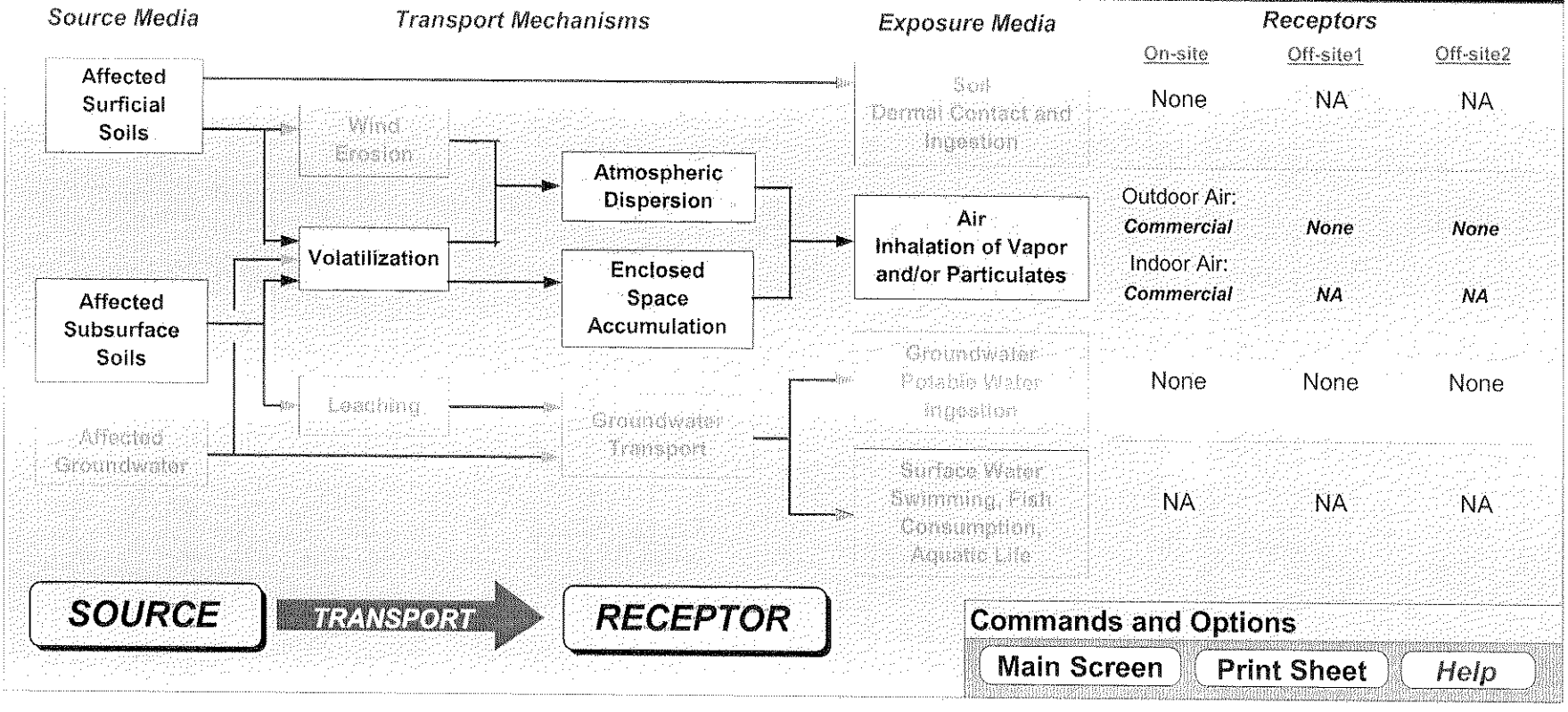


3. Commands and Options

Main Screen | Use Default Values | Print Sheet
Set Units | | Help

Exposure Pathway Flowchart

Site Name: Harry's Automotive, T-1 Job ID: 014-05051
Location: 1606 S. Orange Ave., Fresno, CA Date: 19-Sep-05
Compl. By: J. Noel



Commands and Options

Main Screen | Print Sheet | Help

CHEMICAL DATA FOR SELECTED COCs

Physical Property Data

Constituent	CAS Number	type	Molecular Weight (g/mole) MW	ref	Diffusion Coefficients in air (cm2/s) Dair	ref	in water (cm2/s) Dwat	ref	log (Koc) or log(Kd) (@ 20 - 25 C) log(L/kg) partition	ref	Henry's Law Constant (@ 20 - 25 C) (atm-m3) mol	(unitless)	ref	Vapor Pressure (@ 20 - 25 C) (mm Hg)	ref	Solubility (@ 20 - 25 C) (mg/L)	ref	acid pKa	base pKb	ref
Benzene	71-43-2	A	78.1	PS	8.80E-02	PS	9.80E-06	PS	1.77	Koc	PS	5.55E-03	2.29E-01	PS	9.52E+01	PS	1.75E+03	PS	-	-	-
Toluene	108-88-3	A	92.4	5	8.50E-02	A	9.40E-06	A	2.13	Koc	A	6.30E-03	2.60E-01	A	3.00E+01	4	5.15E+02	29	-	-	-
Ethylbenzene	100-41-4	A	106.2	PS	7.50E-02	PS	7.80E-06	PS	2.56	Koc	PS	7.88E-03	3.25E-01	PS	1.00E+01	PS	1.69E+02	PS	-	-	-
Xylene (mixed isomers)	1330-20-7	A	106.2	5	7.20E-02	A	8.50E-06	A	2.38	Koc	A	7.03E-03	2.90E-01	A	7.00E+00	4	1.98E+02	5	-	-	-
TPH - Arom >C05-C07	0-00-0	T	78	T	1.00E-01	T	1.00E-05	T	1.90	Koc	T	5.63E-03	2.32E-01	T	9.88E+01	-	1.80E+03	T	-	-	-

Site Name: Harry's Automotive, T-1

Site Location: 1606 S. Orange Ave., Fresno, CA

Completed By: J. Noel

Date Completed: 19-Sep-05

Job ID: 014-05051

CHEMICAL DATA FOR SELECTED COCs

Toxicity Data

Constituent	Reference Dose (mg/kg/day) Oral RfD_oral	ref	Reference Dose (mg/kg/day) Dermal RfD_dermal	ref	Reference Conc. (mg/m3) Inhalation RfC_inhal	ref	Slope Factors 1/(mg/kg/day) Oral SF_oral	ref	Slope Factors 1/(mg/kg/day) Dermal SF_dermal	ref	Unit Risk Factor 1/(µg/m3) Inhalation URF_inhal	ref	EPA Weight of Evidence	Is Constituent Carcinogenic ?
Benzene	3.00E-03	R	-	-	5.95E-03	R	2.90E-02	PS	2.99E-02	TX	8.29E-06	PS	A	TRUE
Toluene	2.00E-01	A,R	1.60E-01	TX	4.00E-01	A,R	-	-	-	-	-	-	D	FALSE
Ethylbenzene	1.00E-01	PS	9.70E-02	TX	1.00E+00	PS	-	-	-	-	-	-	D	FALSE
Xylene (mixed isomers)	2.00E+00	A,R	1.84E+00	TX	7.00E+00	A	-	-	-	-	-	-	D	FALSE
TPH - Arom >C05-C07	3.00E-03	R	-	-	5.95E-03	R	-	-	-	-	-	-	D	FALSE

Site Name: Harry's Automotive,

Site Location: 1606 S. Orang

Miscellaneous Chemical Data

Constituent	Maximum Contaminant Level MCL (mg/L)	ref	Time-Weighted Average Workplace Criteria TWA (mg/m3)	ref	Aquatic Life Prot. Criteria AQL (mg/L)	ref	Biocon-centration Factor (L-wat/kg-fish)
Benzene	5.00E-03	52 FR 25690	3.25E+00	PS	-	-	12.6
Toluene	1.00E+00	56 FR 3526 (30 Jan 91)	1.47E+02	ACGIH	-	-	70
Ethylbenzene	7.00E-01	56 FR 3526 (30 Jan 91)	4.35E+02	PS	-	-	1
Xylene (mixed isomers)	1.00E+01	56 FR 3526 (30 Jan 91)	4.34E+02	ACGIH	-	-	1
TPH - Arom >C05-C07	-	-	-	-	-	-	1

Site Name: Harry's Automotive,
Site Location: 1606 S. Orang

CHEMICAL DATA FOR SELECTED COCs

Miscellaneous Chemical Data

Constituent	Dermal Relative Absorp. Factor (unitless)	Water Dermal Permeability Data: Dermal Permeability Coeff. (cm/hr)	Lag time for Dermal Exposure (hr)	Critical Exposure Time (hr)	Relative Contr of Derm Perm Coeff (unitless)	Water/Skin Derm Adsorp Factor (cm/event)	ref	Detection Limits: Groundwater (mg/L)	ref	Soil (mg/kg)	ref	Half Life (First-Order Decay) (days): Saturated	Unsaturated	ref
Benzene	0.5	0.021	0.26	0.63	0.013	7.3E-2	D	0.002	S	0.005	S	720	720	H
Toluene	0.5	0.045	0.32	0.77	0.054	1.6E-1	D	0.002	S	0.005	S	28	28	H
Ethylbenzene	0.5	0.074	0.39	1.3	0.14	2.7E-1	D	0.002	S	0.005	S	228	228	H
Xylene (mixed isomers)	0.5	0.08	0.39	1.4	0.16	2.9E-1	D	0.005	S	0.005	S	360	360	H
TPH - Arom >C05-C07	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-

Site Name: Harry's Automotive,
Site Location: 1606 S. Orang

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: Harry's Automotive, T-1
Site Location: 1606 S. Orange Ave., Fresno, CA

Completed By: J. Noel
Date Completed: 19-Sep-05

Job ID: 014-05051

Exposure Parameters		Residential			Commercial/Industrial	
		Adult	(1-6yrs)	(1-16 yrs)	Chronic	Construc
AT_c	Averaging time for carcinogens (yr)	70				
AT_n	Averaging time for non-carcinogens (yr)	30			25	1
BW	Body weight (kg)	70	15	35	70	
ED	Exposure duration (yr)	30	6	16	25	1
-	Averaging time for vapor flux (yr)	30			25	1
EF	Exposure frequency (days/yr)	350			250	180
EF_D	Exposure frequency for dermal exposure	350			250	
IR_w	Ingestion rate of water (L/day)	2			1	
IR_s	Ingestion rate of soil (mg/day)	100	200		50	100
SA	Skin surface area (dermal) (cm^2)	5800		2023	5800	5800
M	Soil to skin adherence factor	1				
ET_{swim}	Swimming exposure time (hr/event)	3				
EV_{swim}	Swimming event frequency (events/yr)	12	12	12		
IR_{swim}	Water ingestion while swimming (L/hr)	0.05	0.5			
SA_{swim}	Skin surface area for swimming (cm^2)	23000		8100		
IR_{fish}	Ingestion rate of fish (kg/yr)	0.025				
FI_{fish}	Contaminated fish fraction (unitless)	1				

Complete Exposure Pathways and Receptors	On-site	Off-site 1	Off-site 2
Groundwater:			
Groundwater Ingestion	None	None	None
Soil Leaching to Groundwater Ingestion	None	None	None
Applicable Surface Water Exposure Routes:			
Swimming			NA
Fish Consumption			NA
Aquatic Life Protection			NA
Soil:			
Direct Ingestion and Dermal Contact	None		
Outdoor Air:			
Particulates from Surface Soils	None	None	None
Volatilization from Soils	Commercial	None	None
Volatilization from Groundwater	None	None	None
Indoor Air:			
Volatilization from Subsurface Soils	Commercial	NA	NA
Volatilization from Groundwater	None	NA	NA

Receptor Distance from Source Media	On-site	Off-site 1	Off-site 2	(Units)
Groundwater receptor	NA	NA	NA	(ft)
Soil leaching to groundwater receptor	NA	NA	NA	(ft)
Outdoor air inhalation receptor	0	NA	NA	(ft)

Target Health Risk Values		Individual	Cumulative
TR_{ac}	Target Risk (class A&B carcinogens)	1.0E-6	1.0E-5
TR_c	Target Risk (class C carcinogens)	1.0E-5	
THQ	Target Hazard Quotient (non-carcinogenic risk)	1.0E+0	1.0E+0

Modeling Options	
RBCA tier	Tier 2
Outdoor air volatilization model	Surface & subsurface models
Indoor air volatilization model	Johnson & Ettinger model
Soil leaching model	NA
Use soil attenuation model (SAM) for leachate?	NA
Air dilution factor	NA
Groundwater dilution-attenuation factor	NA

NOTE: NA = Not applicable

Surface Parameters		General	Construction	(Units)
A	Source zone area	1.8E+2	NA	(ft^2)
W	Length of source-zone area parallel to wind	1.5E+1	NA	(ft)
W_{gw}	Length of source-zone area parallel to GW flow	NA		(ft)
U_{air}	Ambient air velocity in mixing zone	7.4E+0		(ft/s)
δ_{air}	Air mixing zone height	6.6E+0		(ft)
P_a	Areal particulate emission rate	NA		(g/cm^2/s)
L_{ss}	Thickness of affected surface soils	2.0E+0		(ft)

Surface Soil Column Parameters		Value			(Units)
h_{cap}	Capillary zone thickness	NA			(ft)
h_v	Vadose zone thickness	NA			(ft)
ρ_s	Soil bulk density	1.7E+0			(g/cm^3)
f_{oc}	Fraction organic carbon	2.0E-2			(-)
θ_T	Soil total porosity	2.5E-1			(-)
K_{vs}	Vertical hydraulic conductivity	8.6E-1			(cm/d)
k_v	Vapor permeability	1.1E-14			(ft^2)
L_{gw}	Depth to groundwater	NA			(ft)
L_s	Depth to top of affected soils	9.0E+0			(ft)
L_{base}	Depth to base of affected soils	4.5E+1			(ft)
L_{subs}	Thickness of affected soils	3.6E+1			(ft)
pH	Soil/groundwater pH	7.2E+0			(-)
		capillary	vadose	foundation	
θ_w	Volumetric water content	0.15	0.15	0.12	(-)
θ_a	Volumetric air content	0.1	0.1	0.26	(-)

Building Parameters		Residential	Commercial	(Units)
L_b	Building volume/area ratio	NA	1.00E+1	(ft)
A_b	Foundation area	NA	4.20E+3	(ft^2)
X_{crk}	Foundation perimeter	NA	2.60E+2	(ft)
ER	Building air exchange rate	NA	2.30E-4	(1/s)
L_{crk}	Foundation thickness	NA	4.92E-1	(ft)
Z_{crk}	Depth to bottom of foundation slab	NA	4.92E-1	(ft)
η	Foundation crack fraction	NA	5.00E-3	(-)
dP	Indoor/outdoor differential pressure	NA	0.00E+0	(g/cm/s^2)
Q_s	Convective air flow through slab	NA	0.00E+0	(ft^3/s)

Groundwater Parameters		Value	(Units)
δ_{gw}	Groundwater mixing zone depth	NA	(ft)
i_f	Net groundwater infiltration rate	NA	(cm/yr)
U_{gw}	Groundwater Darcy velocity	NA	(cm/d)
V_{gw}	Groundwater seepage velocity	NA	(cm/d)
K_s	Saturated hydraulic conductivity	NA	(cm/d)
i	Groundwater gradient	NA	(-)
S_w	Width of groundwater source zone	NA	(ft)
S_d	Depth of groundwater source zone	NA	(ft)
θ_{eff}	Effective porosity in water-bearing unit	NA	(-)
f_{oc-sat}	Fraction organic carbon in water-bearing unit	NA	(-)
pH_{sat}	Groundwater pH	NA	(-)
	Biodegradation considered?	NA	

Transport Parameters		Off-site 1	Off-site 2	Off-site 1	Off-site 2	(Units)
Lateral Groundwater Transport		Groundwater Ingestion		Soil Leaching to GW		
α_x	Longitudinal dispersivity	NA	NA	NA	NA	(ft)
α_y	Transverse dispersivity	NA	NA	NA	NA	(ft)
α_z	Vertical dispersivity	NA	NA	NA	NA	(ft)
Lateral Outdoor Air Transport		Soil to Outdoor Air Inhal.		GW to Outdoor Air Inhal.		
σ_y	Transverse dispersion coefficient	NA	NA	NA	NA	(ft)
σ_z	Vertical dispersion coefficient	NA	NA	NA	NA	(ft)
ADF	Air dispersion factor	NA	NA	NA	NA	(-)

Surface Water Parameters		Off-site 2	(Units)
Q_{sw}	Surface water flowrate	NA	(ft^3/s)
W_p	Width of GW plume at SW discharge	NA	(ft)
δ_p	Thickness of GW plume at SW discharge	NA	(ft)
DF_{sw}	Groundwater-to-surface water dilution factor	NA	(-)

RBCA SITE ASSESSMENT | User-Specified COC Data

REPRESENTATIVE COC CONCENTRATIONS IN SOURCE MEDIA

CONSTITUENT	Representative COC Concentration			
	Groundwater		Soils (9 - 45 ft)	
	value (mg/L)	note	value (mg/kg)	note
Benzene			1.4E+1	
Toluene			4.3E+1	
Ethylbenzene			5.9E+1	
Xylene (mixed isomers)			4.5E+2	
TPH - Arom >C05-C07			1.7E+3	

Site Name: Harry's Automotive, T-1
Site Location: 1606 S. Orange Ave., Fresno, CA
Completed By: J. Noel

Date Completed: 19-Sep-05
Job ID: 014-05051

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS ☐ (CHECKED IF PATHWAY IS ACTIVE)

SURFACE SOILS:

VAPOR INHALATION

Constituents of Concern	1) Source Medium	2) NAF Value (m^3/kg) Receptor				3) Exposure Medium Outdoor Air: POE Conc. (mg/m^3) (1) / (2)			
	Soil Conc. (mg/kg)	On-site (0 ft)		Off-site 1 (0 ft)	Off-site 2 (0 ft)	On-site (0 ft)		Off-site 1 (0 ft)	Off-site 2 (0 ft)
		Commercial	Construction Worker	None	None	Commercial	Construction Worker	None	None
Benzene	1.4E+1								
Toluene	4.3E+1								
Ethylbenzene	5.9E+1								
Xylene (mixed isomers)	4.5E+2								
TPH - Arom >C05-C07	1.7E+3								

NOTE: NAF = Natural attenuation factor POE = Point of exposure

Site Name: Harry's Automotive, T-1
Site Location: 1606 S. Orange Ave., Fresno, CA
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RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS

SURFACE SOILS:

VAPOR INHALATION (cont'd)

Constituents of Concern	4) Exposure Multiplier (EFxED)/(ATx365) (unitless)				5) Average Inhalation Exposure Concentration (mg/m^3) (3) X (4)			
	On-site (0 ft)		Off-site 1 (0 ft)	Off-site 2 (0 ft)	On-site (0 ft)		Off-site 1 (0 ft)	Off-site 2 (0 ft)
	Commercial	Construction Worker	None	None	Commercial	Construction Worker	None	None
Benzene								
Toluene								
Ethylbenzene								
Xylene (mixed isomers)								
TPH - Arom >C05-C07								

NOTE: AT = Averaging time (days) EF = Exposure frequency (days/yr) ED = Exposure duration (yr)

Site Name: Harry's Automotive, T-1
Site Location: 1606 S. Orange Ave., Fresno, CA
Completed By: J. Noel

Date Completed: 19-Sep-05
Job ID: 014-05051

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS ■ **(CHECKED IF PATHWAY IS ACTIVE)**

SUBSURFACE SOILS (9 - 45 ft):

VAPOR INHALATION

	1) Source Medium	2) NAF Value (m^3/kg) Receptor			3) Exposure Medium Outdoor Air: POE Conc. (mg/m^3) (1) / (2)		
Constituents of Concern	Soil Conc. (mg/kg)	On-site (0 ft) Commercial	Off-site 1 (0 ft) None	Off-site 2 (0 ft) None	On-site (0 ft) Commercial	Off-site 1 (0 ft) None	Off-site 2 (0 ft) None
Benzene	1.4E+1	2.3E+5			6.3E-5		
Toluene	4.3E+1	4.6E+5			9.4E-5		
Ethylbenzene	5.9E+1	1.1E+6			5.5E-5		
Xylene (mixed isomers)	4.5E+2	8.5E+5			5.3E-4		
TPH - Arom >C05-C07	1.7E+3	2.6E+5			6.4E-3		

NOTE: NAF = Natural attenuation factor POE = Point of exposure

Site Name: Harry's Automotive, T-1
Site Location: 1606 S. Orange Ave., Fresno, CA
Completed By: J. Noel

Date Completed: 19-Sep-05
Job ID: 014-05051

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS

SUBSURFACE SOILS (9 - 45 ft):

VAPOR INHALATION (cont'd)

Constituents of Concern	4) Exposure Multiplier (EFxED)/(ATx365) (unitless)			5) Average Inhalation Exposure Concentration (mg/m^3) (3) X (4)		
	On-site (0 ft) Commercial	Off-site 1 (0 ft) None	Off-site 2 (0 ft) None	On-site (0 ft) Commercial	Off-site 1 (0 ft) None	Off-site 2 (0 ft) None
Benzene	2.4E-1			1.5E-5		
Toluene	6.8E-1			6.5E-5		
Ethylbenzene	6.8E-1			3.7E-5		
Xylene (mixed isomers)	6.8E-1			3.6E-4		
TPH - Arom >C05-C07	6.8E-1			4.4E-3		

NOTE: AT = Averaging time (days) EF = Exposure frequency (days/yr) ED = Exposure duration (yr)

Site Name: Harry's Automotive, T-1
Site Location: 1606 S. Orange Ave., Fresno, CA
Completed By: J. Noel

Date Completed: 19-Sep-05
Job ID: 014-05051

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS ☐ (CHECKED IF PATHWAY IS ACTIVE)

GROUNDWATER: VAPOR INHALATION

Exposure Concentration

Constituents of Concern	1) Source Medium	2) NAF Value (m^3/L) Receptor			3) Exposure Medium Outdoor Air: POE Conc. (mg/m^3) (1) / (2)		
	Groundwater Conc. (mg/L)	On-site (0 ft) None	Off-site 1 (0 ft) None	Off-site 2 (0 ft) None	On-site (0 ft) None	Off-site 1 (0 ft) None	Off-site 2 (0 ft) None
Benzene							
Toluene							
Ethylbenzene							
Xylene (mixed isomers)							
TPH - Arom >C05-C07							

NOTE: NAF = Natural attenuation factor POE = Point of exposure

Site Name: Harry's Automotive, T-1
Site Location: 1606 S. Orange Ave., Fresno, CA
Completed By: J. Noel

Date Completed: 19-Sep-05
Job ID: 014-05051

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS

GROUNDWATER: VAPOR

INHALATION (cont'd)

Constituents of Concern	4) Exposure Multiplier (EFxED)/(ATx365) (unitless)			5) Average Inhalation Exposure Concentration (mg/m^3) (3) X (4)		
	On-site (0 ft)	Off-site 1 (0 ft)	Off-site 2 (0 ft)	On-site (0 ft)	Off-site 1 (0 ft)	Off-site 2 (0 ft)
	None	None	None	None	None	None
Benzene						
Toluene						
Ethylbenzene						
Xylene (mixed isomers)						
TPH - Arom >C05-C07						

NOTE: AT = Averaging time (days) EF = Exposure frequency (days/yr) ED = Exposure duration (yr)

Site Name: Harry's Automotive, T-1
Site Location: 1606 S. Orange Ave., Fresno, CA
Completed By: J. Noel

Date Completed: 19-Sep-05
Job ID: 014-05051

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS

TOTAL PATHWAY EXPOSURE (mg/m^3)
(Sum average expsosure concentrations from soil and groundwater routes.)

Constituents of Concern	On-site (0 ft) Commercial	On-site (0 ft) Construction Worker	Off-site 1 (0 ft) None	Off-site 2 (0 ft) None
Benzene	1.5E-5			
Toluene	6.5E-5			
Ethylbenzene	3.7E-5			
Xylene (mixed isomers)	3.6E-4			
TPH - Arom >C05-C07	4.4E-3			

Site Name: Harry's Automotive, T-1
Site Location: 1606 S. Orange Ave., Fresno, CA
Completed By: J. Noel

Date Completed: 19-Sep-05
Job ID: 014-05051

RBCA SITE ASSESSMENT

TIER 2 PATHWAY RISK CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS ■ **(CHECKED IF PATHWAYS ARE ACTIVE)**

CARCINOGENIC RISK

Constituents of Concern	(1) EPA Carcinogenic Classification	(2) Total Carcinogenic Exposure (mg/m^3)				(3) Inhalation Unit Risk Factor (µg/m^3)^-1	(4) Individual COC Risk (2) x (3) x 1000			
		On-site (0 ft)		Off-site 1 (0 ft)	Off-site 2 (0 ft)		On-site (0 ft)		Off-site 1 (0 ft)	Off-site 2 (0 ft)
		Commercial	Construction Worker	None	None		Commercial	Construction Worker	None	None
Benzene	A	1.5E-5				8.3E-6	1.3E-7			
Toluene	D									
Ethylbenzene	D									
Xylene (mixed isomers)	D									
TPH - Arom >C05-C07	D									

Total Pathway Carcinogenic Risk = **1.3E-7**

Site Name: Harry's Automotive, T-1
Site Location: 1606 S. Orange Ave., Fresno, CA

Completed By: J. Noel
Date Completed: 19-Sep-05

Job ID: 014-05051

RBCA SITE ASSESSMENT

TIER 2 PATHWAY RISK CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS ■ (CHECKED IF PATHWAYS ARE ACTIVE)

TOXIC EFFECTS

Constituents of Concern	(5) Total Toxicant Exposure (mg/m^3) On-site (0 ft) Commercial	On-site (0 ft) Construction Worker	Off-site 1 (0 ft)	Off-site 2 (0 ft)	(6) Inhalation Reference Conc. (mg/m^3)	(7) Individual COC Hazard Quotient (5) / (6) On-site (0 ft) Commercial	On-site (0 ft) Construction Worker	Off-site 1 (0 ft)	Off-site 2 (0 ft)
			None	None				None	None
Benzene	4.3E-5				6.0E-3	7.3E-3			
Toluene	6.5E-5				4.0E-1	1.6E-4			
Ethylbenzene	3.7E-5				1.0E+0	3.7E-5			
Xylene (mixed isomers)	3.6E-4				7.0E+0	5.2E-5			
TPH - Arom >C05-C07	4.4E-3				6.0E-3	7.4E-1			
Total Pathway Hazard Index =						**7.5E-1**			

Site Name: Harry's Automotive, T-1
Site Location: 1606 S. Orange Ave., Fresno, CA

Completed By: J. Noel
Date Completed: 19-Sep-05

Job ID: 014-05051

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

INDOOR AIR EXPOSURE PATHWAYS ■ (CHECKED IF PATHWAY IS ACTIVE)

SOILS (9 - 45 ft): VAPOR INTRUSION INTO ON-SITE BUILDINGS

Constituents of Concern	1) Source Medium Soil Conc. (mg/kg)	2) NAF Value (m^3/kg) Receptor Commercial	3) Exposure Medium Indoor Air: POE Conc. (mg/m^3) (1) / (2) Commercial	4) Exposure Multiplier (EFxED)/(ATx365) (unitless) Commercial	5) Average Inhalation Exposure Concentration (mg/m^3) (3) X (4) Commercial
Benzene	1.4E+1	3.3E+2	4.3E-2	2.4E-1	1.1E-2
Toluene	4.3E+1	6.7E+2	6.4E-2	6.8E-1	4.4E-2
Ethylbenzene	5.9E+1	1.6E+3	3.7E-2	6.8E-1	2.6E-2
Xylene (mixed isomers)	4.5E+2	1.2E+3	3.6E-1	6.8E-1	2.5E-1
TPH - Arom >C05-C07	1.7E+3	3.8E+2	4.4E+0	6.8E-1	3.0E+0

NOTE AT = Averaging time (days) EF = Exposure frequency (days/yr) ED = Exposure duration (yr) NAF = Natural attenuation factor POE = Point of exposure

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TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

INDOOR AIR EXPOSURE PATHWAYS ☐ (CHECKED IF PATHWAY IS ACTIVE)

GROUNDWATER: VAPOR INTRUSION INTO ON-SITE BUILDINGS

Exposure Concentration

Constituents of Concern	1) Source Medium Groundwater Conc. (mg/L)	2) NAF Value (m^3/L) Receptor None	3) Exposure Medium Indoor Air: POE Conc. (mg/m^3) (1) / (2) None	4) Exposure Multiplier (EFxED)/(ATx365) (unitless) None	5) Average Inhalation Exposure Concentration (mg/m^3) (3) X (4) None
Benzene					
Toluene					
Ethylbenzene					
Xylene (mixed isomers)					
TPH - Arom >C05-C07					

NOTE AT = Averaging time (days) EF = Exposure frequency (days/yr) ED = Exposure duration (yr) NAF = Natural attenuation factor POE = Point of exposure

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TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

INDOOR AIR EXPOSURE PATHWAYS

Constituents of Concern	TOTAL PATHWAY EXPOSURE (mg/m^3) *(Sum average expsosure concentrations from soil and groundwater routes.)* Commercial
Benzene	1.1E-2
Toluene	4.4E-2
Ethylbenzene	2.6E-2
Xylene (mixed isomers)	2.5E-1
TPH - Arom >C05-C07	3.0E+0

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RBCA SITE ASSESSMENT

TIER 2 PATHWAY RISK CALCULATION

INDOOR AIR EXPOSURE PATHWAYS ■ (CHECKED IF PATHWAYS ARE ACTIVE)

Constituents of Concern	(1) EPA Carcinogenic Classification	(2) Total Carcinogenic Exposure (mg/m^3) Commercial	(3) Inhalation Unit Risk Factor (µg/m^3)^-1	(4) Individual COC Risk (2) x (3) x 1000 Commercial
		CARCINOGENIC RISK		
Benzene	A	1.1E-2	8.3E-6	8.8E-5
Toluene	D			
Ethylbenzene	D			
Xylene (mixed isomers)	D			
TPH - Arom >C05-C07	D			

Total Pathway Carcinogenic Risk = **8.8E-5**

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RBCA SITE ASSESSMENT

TIER 2 PATHWAY RISK CALCULATION

INDOOR AIR EXPOSURE PATHWAYS ■ (CHECKED IF PATHWAYS ARE ACTIVE)

Constituents of Concern	(5) Total Toxicant Exposure (mg/m^3) Commercial	(6) Inhalation Reference Concentration (mg/m^3) TOXIC EFFECTS	(7) Individual COC Hazard Quotient (5) / (6) Commercial
Benzene	3.0E-2	6.0E-3	5.0E+0
Toluene	4.4E-2	4.0E-1	1.1E-1
Ethylbenzene	2.6E-2	1.0E+0	2.6E-2
Xylene (mixed isomers)	2.5E-1	7.0E+0	3.5E-2
TPH - Arom >C05-C07	3.0E+0	6.0E-3	5.1E+2

Total Pathway Hazard Index = **5.1E+2**

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